4-20 of (1)

OU III AR 576

PROGRAM DIRECTIVE

Monticllo Mill Tailing Site - MSGRAP Directive Directive No. MSGRAP-93-01

INITIATED BY: Kristen L. McClellen, MSGRAP Technical Project Manager

EFFECTIVE DATE: October 1, 1993 **EXPIRATION DATE:** September 30, 1994

SUBJECT: Revised surface- and ground-water sampling schedule, sampling locations, analyte list and clarification of sample custody procedures for MSGRAP FY 1994 sampling scheduled to begin October 25, 1993.

JUSTIFICATION FOR PROGRAM DIRECTIVE AND ASSICIATED TASK CHANGES:

1. DOE-GJPO and DOE-HQ, EPA Region VIII, and State of Utah concurrence to reduce the sampling frequency, sampled locations and the analyte list on the basis of a preliminary reveiw of the data from the baseline sampling performed during FY 1993. (Reference Attachment 1 summary letter)

. Inconsistencies were noted in project documents and field practices associated with .ne use of custody seals and sample custody records as reported in QA Audit A-93-04 directed finding A-93-04-01). The project documents are scheduled for revision (approval by DOE-GJPO, DOE-HQ, EPA and State) during late FY 1994. The appropriate schedules, sampled locations, analyte list, procedures, etc will be incorporated at that time.

ORGANIZATION(S) AFFECTED: Field Samplers (Environmental Sciences, Environmental Support Operations, and Field Services), DOE-GJPO Analytical Laboratory, Construction Management (Millsite Access and Maintenance), Project Health and Safety support.

PLANS, MANUALS, AND PROCEDURES AFFECTED: The following project documents are affected by the changes:

P-GJPO-751, MMTS OU III, Surface- and Ground-Water RI/FS Work Plan
P-GJPO-752, MMTS OU III, Surface- and Ground-Water RI/FS Field Sampling Plan
P-GJPO-123.1, MMTS OU III, Surface- and Ground-Water RI/FS QA Project Plan

Details of specific sections, pages and paragraphs to be revised are not presented herein. The summary information and tables provided in the Directive will be sufficient to guide ·eld and laboratory personnel in obtaining and analysis of the samples. There are no ,hanges required to current procedures as a result of this directive. Some procedures that are cited may not be used at this time.

PROGRAM DIRECTIVE (continued) **Directive No.** MSGRAP-93-01

DIRECTIVE: MSGRAP Surface- and Ground-Water sample collection will be reduced from a quarterly to a semi-annual frequency. Sampling is planned to occur during October 1993 and April of 1994. The revised sample locations, analyte list, and information pertaining to containers, preservation and holding times for sampling that is planned to begin October 1993 are summarized in the attached tables (Table 1, MSGRAP FY 1994 (October) Surface- and Ground-Water Sample Locations, Table 2 MSGRAP FY 1994 (October) Sample Analyses and Laboratory Reporting Limits, and Table 3, MSGRAP FY 1994 (October), Sample Containers, Preservation, Holding Times, and Analytical Procedures). The number of field duplicates and equipment blanks remains proportional to the environmental samples obtained as modified by this Program Directive.

Chain of Custody procedures will be conducted at follows...

Custody seals will not be applied to coolers/boxes that are in control of Geotech personnel, (i.e., field samplers or assigned transporters). If samples are transported by subcontract personnel or commercial carrier then custody seal(s) will be applied to the outside of the coolers/boxes containing the samples.

Samples stored at locations whose access is not solely controlled by Geotech personnel will be custody sealed on the outside of the container (cooler/box) as a measure of protection.

Chain of Custody forms will be completed by the field sampling team at the time they are relinquished to other Geotech employees, subcontract employees or commercial carrier personnel. If samples are transported by a member of the field sampling team the custody record may be filled out upon relinquishing the samples at the DOE-GJPO Sample Prep. Lab. Custody records will be container (cooler/box) specific when prepared for subcontract or commercial carrier personnel. Custody records for samples transported by Geotech personnel will account for all samples transported but are not requried to be container (cooler/box) specific.

Review and Concurrence (Name/Title):

Sam Campbell — 10/20/93
S.E. Campbell, Field Supervisor — Date

Dennis T. Ealey — 10/20/93
D.T. Ealey, Laboratory Services Coordinator — Date

Farlie Pearl — 10-20-93
F.A. Pearl, QA Coordinator — Date

Program Manager Approval to Issue:

for J.M. Mogollones — 10/20/93
J.A. Perry, Monticello Program Manager — Date

DISTRIBUTION: (w/ attachments)
Program Managers Directive Log
Document holders to referenced Planning Documents (distribution through Records Management)

Revisions to Surface- and Ground-Water Sampling

This paper summarizes changes to surface- and ground-water sampling being conducted under the *Monticello Mill Tailings Site Operable Unit III, Surface- and Ground-Water Remedial Investigation/Feasibility Study Work Plan, Field Sampling Plan, and Quality Assurance Project Plan*. These changes are necessary or appropriate on the basis of data collected during baseline characterization. For clarity, a brief summary is included of the locations that will be sampled, and the analyte list that will be used for sample collection and analysis.

Revisions to Sampling

Surface- and ground-water sampling will be conducted on a semi-annual basis. Organic compound analysis will be collected annually with the first event after baseline characterization to occur in the spring of 1994. Sampling at that time will include an upgradient, three millsite, and a downgradient location. Should construction activities uncover evidence of organic contamination, additional sampling will be required to investigate the nature of the contamination.

Antimony and strontium have been deleted from the analyte list. Beryllium, cyanide, and mercury will be deleted from the analyte list pending final approval from Environmental Protection Agency (EPA) and the State of Utah (the State). Nitrite analysis will continue in samples that are collected from monitoring well 31SW91-23. If results indicate that the concentration of nitrite is increasing at this well, then additional downgradient wells will be considered for monitoring.

A new surface-water sampling location will be included in the sampling rounds beginning in October 1993. Samples will be collected from Montezuma Creek at the old Blanding road crossing site. An old surface-water sampling location (W-5) has been deleted because of Hall's Ditch construction. Geotech will discontinue taking monthly stream flow measurements while previously collected data are analyzed. The list of locations where flow measurements are made will be modified and flow measurements will resume in the spring.

Water level measurements from monitoring wells will continue to be collected monthly except for the months of December and January when no measurements will be taken.

Monitoring well 82-31BE will be substituted for monitoring well 82-31BW; monitoring well 31SW91-03 will be substituted for monitoring well 82-36A.

A peristaltic pump will be installed in monitoring well 92-03 and a bladder pump will be installed in monitoring well 92-05.

Three Burro Canyon wells (84-74, 84-75, and 84-76) will not be sampled because they have been abandoned. Monitoring well 84-77 although scheduled for abandonment, is now slated for reinstallation and development. Because the Burro Canyon well to be installed northeast of the site as part of the Alternative Analysis and well 84-77 have not yet been constructed, sampling of these wells will begin with the high flow event during the spring of 1994.

Table 1. MSGRAP FY 1994 (October) Surface- and Ground-Water Sampling Locations

Area	Matrix	Sample Location	Sampling Technique
Upgradient	Surface Water	SW92-01 SW92-02 SW92-03	Submersion of sample bottle, disposable sampler, peristaltic pump
Upgradient	Ground Water	92-01 92-05 92-02 92-06 92-03 92-13 92-04	Bladder pump, peristaltic pump, submersible pump, bailer
On-site	Surface Water	W-2 Carbonate Seep North Drainage SW92-04 SW92-05	Submersion of sample bottle, disposable sampler, peristaltic pump
On-site	Ground Water	82-30B 82-40A 82-42 82-31BE 84-77 31SW92-03 31SW91-14 31SW91-23	Bladder pump, peristaltic pump, submersible pump, bailer
Downgradient	Surface Water	W-4 Sorenson Site Montezuma Canyon SW92-06 SW92-07 SW92-08 SW92-09 Blanding Road	Submersion of sample bottle, disposable sampler, peristaltic pump
Downgradient	Ground Water	82-07 92-09 83-70 92-10 88-85 92-11 92-07 92-12 92-08	Bladder pump, peristaltic pump, submersible pump, bailer

Table 2. MSGRAP FY 1994 (October) Sample Analyses and Laboratory Reporting Limits

Analytical Parameter	Laboratory Reporting Limit[a] (mg/L)	Analytical Method
Metals		Geotech Methods[b] AS-2, AS-3, AS-5, AS-6, and F-8[c] (EPA Methods 6010, 6020, 7000 Series, and 335.2)
Aluminum	0.10	
~~Antimony~~	~~0.060~~	
Arsenic	0.010	
Barium	0.10	
Beryllium[c]	0.005	
Boron	0.1	
Cadmium	0.005	
Chromium	0.010	
Copper	0.025	
Cyanide[c]	0.020	
Iron	0.050	
Lead	0.005	
Manganese	0.015	
Mercury[c]	0.0002	
Molybdenum	0.050	
Nickel	0.040	
Selenium	0.005	
Silver	0.010	
~~Strontium~~	~~0.01~~	
Thallium	0.010	
Uranium	0.005	
Vanadium	0.050	
Zinc	0.020	
Total Dissolved Solids	10.0	EPA Method 160.1
Major Anions		Geotech Method[b] D-3 (EPA Method 300)
Chloride	1.0	
Sulfate	0.2	
Fluoride	0.2	
Nitrate	0.2	
Nitrite[d]	0.2	

[a]The detection limits depend on sample types and matrix.
[b]Geotech Methods listed are Geotech SOPs for the EPA Method listed.
[c]To be deleted pending final approval from EPA and the State.
[d]Sample collected at monitoring well 31SW91-23 only.

Table 2 (cont.). MSGRAP FY 1994 (October) Sample Analyses and Laboratory Reporting Limits

Analytical Parameter	Laboratory Reporting Limit[a]	Analytical Method
Major Cations	mg/L	Geotech Methods[b] F-6 and AS-5; (EPA Methods 350.1 6010)
Ammonium	0.02	
Calcium	1.0	
Magnesium	1.0	
Potassium	1.0	
Sodium	1.0	
Radionuclides	pCi/L	Geotech Methods RC-3 RC-6, RC-2, RC-5, RC-1, RC-17
Gross alpha	1.0	
Gross beta	1.0	
Lead-210	2.0	
Polonium-210	0.5	
Radium-226	0.5	
Radium-228	1.0	
Thorium-230	0.3	
Thorium-232	0.3	
Uranium-234, Uranium-238	0.3	
Radon-222	300	

[a]The detection limits depend on sample types, matrix, and counting time for radionuclides.

[b]Geotech Methods listed are Geotech SOPs for the EPA Method listed.

Table 3. MSGRAP FY 1994 (October) Sample Co[illegible]. Preservation, Holding Times, and Analytical Procedures

Analytical Parameter	Matrix	Container Type/Size[a]	Preservation	Holding Time	Analytical Method[b]
~~TGL Volatile Organics~~	~~Water~~	~~Glass with Teflon Septa/33-40 mL (amber preferred)~~	~~No Residual Chlorine Conc. HCL to pH <2; Cool to 4°C Residual Chlorine $Na_2S_2O_3$ to 0.008%; Cool to 4°C~~	~~14 Days~~	~~Geotech Method BB-1; EPA Method 8240 and 8260~~
~~TGL SemiVolatile Organics~~	~~Water~~	~~Glass with Teflon Lined Cap/2 to 6 L (amber preferred)~~	~~No Residual Chlorine Cool to 4°C Residual Chlorine $Na_2S_2O_3$ to 0.008%; Cool to 4°C~~	~~Extr. 7 Days; Anal. 40 Days~~	~~Geotech Method BB-2; EPA Method 8270~~
~~Polychlorinated Biphenyls~~	~~Water~~	~~Glass with Teflon Lined Cap/1 L (amber preferred)~~	~~Cool to 4°C~~	~~Extr. 7 Days Anal. 40 Days~~	~~Geotech Method AA-4; EPA Method 8080~~
~~Pesticides (from same sample bottle as PCBs)~~	~~Water~~	~~Glass with Teflon Lined Cap (amber preferred)~~	~~Cool to 4°C~~	~~Extr. 7 Days Anal. 40 Days~~	~~Geotech Method AA-4; EPA Method 8080~~
~~Chlorinated Herbicides~~	~~Water~~	~~Glass with Teflon Lined Cap/1 L (amber preferred)~~	~~Cool to 4°C~~	~~Extr. 7 Days Anal. 40 Days~~	~~Geotech Method AA-3; EPA Method 8150~~
~~TGL~~ Metals[d] (Ag,Al,As,Ba, Be,Cd,Cr,Cu,Fe,Hg,Mn,Ni,Pb, ~~Sb~~,Se,Tl,V,Zn, plus B,Mo,~~Sr~~)	Water	HDPE[c]/500 mL Amber Bottle	HNO_3 to pH <2	6 Months	Geotech Methods AS-2, AS-3, AS-5, and AS-6 EPA Method 6010, 6020, and 7000 Series
Inorganics (Ca,Mg,K,Na) (from same sample bottle as ~~TGL~~ Metals)	Water	HDPE	HNO_3 to pH <2	6 Months	Geotech Method AS-5; EPA Method 6010
Inorganics[d] (Cn)	Water	HDPE/1 L	NaOH to pH >12; Cool to 4°C; 0.06 grams/L Ascorbic Acid if any Residual Chlorine	14 Days	Geotech Method F-8; EPA Method 335.2
Inorganics (Cl,F,$SO_4$and NO_2[e])	Water	HDPE/125 mL	Filter through 0.45 µm filter; Cool to 4°C	28 Days	Geotech Method D-3; EPA Method 300
Inorganics (~~NO_2[e]~~, (NO_3 + NO_2)-N ~~(from same sample bottle as Cl, F and SO_4)~~	Water	HDPE/125 mL	Filter through 0.45 µm filter; Cool to 4°C H_2SO_4 to pH <2	~~48 Hours~~ 28 Days	Geotech Method D-3; EPA Method 300
Inorganics (NH_4)	Water	HDPE/125 mL	Filter through 0.45 µm filter; H_2SO_4 to pH <2	28 Days	Geotech Method F-6; EPA Method 350.1

[a]Sample volumes may vary according to laboratory requirements.

[b]Geotech methods are described in the following Geotech manuals: "Analytical Chemistry Laboratory Administrative Plan and Quality Control Procedures and "Analytical Chemistry Laboratory Handbook of Analytical and Sample Preparation Procedures.

[c]HDPE = High Density Polyethylene

[d]Be, Hg and Cn may be deleted pending final approval from EPA and the State

[e]Nitrite sample will be collected at monitor well 31SW91-23 only, collection will be from same bottle as Cl, F, and SO_4 (i.e., HDPE 125 mL, filtered, cooled and having a 48 hour holding time

Table 3 (continued). MSGRAP FY 1994 (October) Sample ...iners, Preservation, Holding Times, and Analytical Procedures

Analytical Parameter	Matrix	Container Type/Size[a]	Preservation	Holding Time	Analytical Method[b]
Total Dissolved Solids (filterable residue)	Water	HDPE[c]/125 mL	Cool to 4°C	7 Days	EPA Method 160.1
Gross Alpha/Gross Beta	Water	HDPE/1 L	Filter through 0.45 µm filter; HNO_3 to pH <2	6 Months	Geotech Method RC-3
Radium-226	Water	HDPE/3 @ 1 L	Filter through 0.45 µm filter; HNO_3 to pH <2	6 Months	Geotech Method RC-5
Radium-228 (from same sample bottles as Ra-226)	Water	HDPE	Filter through 0.45 µm filter; HNO_3 to pH <2	6 Months	Geotech Method RC-5
Radon-222	Water	Glass with Teflon Septa/3 @ 40 mL	Cool to 4°C	not established	Geotech Method RC-17
Uranium-234	Water	HDPE/1 L	Filter through 0.45 µm filter; HNO_3 to pH <2	6 Months	Geotech Method RC-1
Uranium-238 (from same sample bottle as U-234)	Water	HDPE	Filter through 0.45 µm filter; HNO_3 to pH <2	6 Months	Geotech Method RC-1
Thorium-230 (from same sample bottle as U-234)	Water	HDPE	Filter through 0.45 µm filter; HNO_3 to pH <2	6 Months	Geotech Method RC-1
Thorium-232 (from same sample bottle as U-234)	Water	HDPE	Filter through 0.45 µm filter; HNO_3 to pH <2	6 Months	Geotech Method RC-1
Lead-210	Water	HDPE/1 L	Filter through 0.45 µm filter; HNO_3 to pH <2	6 Months	Geotech Method RC-6
Polonium-210	Water	HDPE/1 L	Filter through 0.45 µm filter; HNO_3 to pH <2	6 Months	Geotech Method RC-2

[a]Sample volumes may vary according to laboratory requirements.
[b]Geotech methods are described in the following Geotech manuals: "Analytical Chemistry Laboratory Administrative Plan and Quality Control Procedures" and "Analytical Chemistry Laboratory Handbook of Analytical and Sample Preparation Procedures."
[c]HDPE = High Density Polyethylene

4-B (2) 20

OUIII AR 576

PROGRAM DIRECTIVE

Monticello Mill Tailings Site - MSGRAP Directive **Directive No. MSGRAP-94-01**

INITIATED BY: Deborah L. Richardson, MSGRAP Project Manager

EFFECTIVE DATE: April 25, 1994 **EXPIRATION DATE:** September 30, 1994

SUBJECT: Revised surface- and ground-water sampling schedule, sampling locations, analyte list and clarification of sample custody procedures for the second and final sampling event for MSGRAP FY 1994, scheduled to begin April 25, 1994.

JUSTIFICATION FOR PROGRAM DIRECTIVE AND ASSOCIATED TASK CHANGES:

1. DOE-GJPO and DOE-HQ, EPA Region VIII, and State of Utah concurrence to reduce the sampling frequency, sampled locations and the analyte list on the basis of a preliminary review of the data from the baseline sampling performed during FY 1993 (revisions summarized in Attachment 1).

2. Inconsistencies were noted in project documents and field practices associated with the use of custody seals and sample custody records as reported in QA Audit A-93-04 directed finding A-93-04-01. The project documents are scheduled for revision (approval by DOE-GJPO, DOE-HQ, EPA and State) during late FY 1994. The appropriate schedules, sampled locations, analyte list, procedures, etc., will be incorporated at that time.

ORGANIZATION(S) AFFECTED: Field Samplers (Environmental Sciences, Environmental Support Operations, and Field Services), DOE-GJPO Analytical Laboratory, Construction Management (Millsite Access and Maintenance), Project Health and Safety support.

PLANS, MANUALS, AND PROCEDURES AFFECTED: The following project documents are affected by the changes:

P-GJPO-751, MMTS OU III, Surface- and Ground-Water RI/FS Work Plan
P-GJPO-752, MMTS OU III, Surface- and Ground-Water RI/FS Field Sampling Plan
P-GJPO-123.1, MMTS OU III, Surface- and Ground-Water RI/FS QA Project Plan

Details of specific sections, pages and paragraphs to be revised are not presented herein. The summary information and tables provided in the Directive will be sufficient to guide field and laboratory personnel in obtaining and analysis of the samples. There are no changes required to current procedures as a result of this directive. Some procedures that are cited may not be used at this time.

ATTACHMENT 1
Revisions to Sampling Program

This Attachment to Program Directive MSGRAP-94-01 summarizes revisions to the surface- and ground water sampling program being implemented under the *Monticello Mill Tailings Site* (MMTS) *Operable Unit III, Surface- and Ground Water Remedial Investigation/Feasibility Study Work Plan, Field Sampling Plan, and Quality Assurance Project Plan*, September 1992. The changes are necessary or appropriate based on the results of the recently completed surface- and ground water baseline characterization. The revised sampling locations and analyte lists for FY 1994, as well as general sample collection, handling, and analytical information are summarized in the accompanying Tables 1 through 3.

Revised Ground Water and Surface Water Sampling Frequency/Schedule
Surface water and ground water sampling will be conducted on a semi-annual basis during FY 1994. The initial sampling event for FY 1994 was completed during October 1993. The second and final sampling event for FY 1994 is scheduled to begin on April 25, 1994.

Sampling and Analysis for Organic Compounds
Analysis for organic compounds in ground water samples will be conducted on an annual basis. The annual sampling and analysis for organic compounds will be initiated in the April 1994 sampling event. The annual sampling for organics is to include one location upgradient of the MMTS, three MMTS locations, and one downgradient location from among the established sampling locations. Ground water samples collected for analysis of organic compounds must be obtained from monitoring wells completed in the upper flow system.

The following wells will include analysis for organic compounds during the April 1994 sampling event: 92-05 (upgradient); 82-30B, 31SW91-03, and 31SW91-14 (on-site); and, 88-85 (downgradient).

Additional sampling and analysis for organic compounds may be required should evidence of organic contamination be uncovered during site construction activities.

Sampling and Analysis for Inorganic Analytes
Analysis for antimony, beryllium, cyanide, mercury, and strontium will be discontinued during FY 1994. Nitrite analysis will be discontinued for all surface water and groundwater samples, with one exception: monitoring well 31SW91-23 will include analysis for nitrite. If results indicate that nitrite concentrations are increasing at this location, additional downgradient monitoring wells will be considered for nitrite analysis in subsequent sampling rounds.

Analysis for arsenic and selenium will be performed according to Geotech methods AS-2 (graphite furnace atomic absorption) and AS-5 (inductively coupled plasma emission spectrometry) for the April 1994 event. Prior analyses for arsenic and selenium was performed according to Geotech Method AS-5 only. The results of the April 1994 event

will be used to determine if analysis by Method AS-2 achieves project data quality objectives for arsenic and selenium. If so, Method AS-5 may be considered to replace Method AS-2, where appropriate, in future sampling events. Sustitution of the methods for arsenic and selenium analysis is likely to reduce analyitcal costs and remove some ambiguity in the GFAA data. The field portion of the sampling program will not be affected by the multiple analyses.

Burro Canyon Formation/Dakota Sandstone Groundwater Sampling Locations

Three Burro Canyon wells (84-74, 84-75, and 84-76) were recently abandoned and will therefore not be sampled during FY 1994 or subsequent years. Reconstruction of Burro Canyon Formation monitoring well 84-77 was completed in October 1993, at which time it was renamed Well 93-01. Wells 93-01 and 92-13, lower Dakota Sandstone monitoring wells, were sampled during October 1993 and will be sampled during the April 1994 event. Burro Canyon Formation monitoring well 31NE93-205, installed in November 1993, will also be added to the sampling program beginning with the April 1994 event.

Revised Shallow Flow System Groundwater Sampling Locations

Monitoring well 82-31BE will be substituted for monitoring well 82-31BW; monitoring well 31SW91-03 will be substituted for for monitoring well 82-36A. These substitutions were initiated in the October 1993 sampling event for FY 1994, and also apply to the April 1994 sampling event.

Revised Surface Water Sampling Locations

A new surface water sampling location ("Blanding Road" site) was recommended by USEPA for FY 94. However, the "Blanding Road" site coincided with the established Montezuma Canyon location. USEPA determined the Montezuma Canyon location to be satisfactory. Therefore, no new surface water sampling locations are included in FY 94.

Surface water sampling at the previous W-5 location will be discontinued because construction of Hall's Ditch has diverted surface water from that location.

Stream Flow Measurement

Monthly stream flow measurements were postponed as of October 1993 but will resume in April 1994. The streamflow measurement network will consist of the same sites used in the Baseline Characterization program during 1992 and 1993, with two additional sites. One new site will be located approximately 1000 feet south of the Vega/Montezuma Creek confluence and will be referred to as site SW94-01. This location will provide stream flow data necessary to evaluate sedimentation and sediment transport rates in the upper reach of Montezuma Canyon. The second new stream flow measurement site (SW94-02) will be located near the eastern edge of the BLM complex and west of the Carbonate Pile, between locations SW92-03 and SW92-04. This location will be used to quantify influent/effluent stream conditions on the millsite in the stretch of Montezuma Creek upstream of the tailings piles.

Surface water temperature will now be measured and recorded on a monthly basis at each stream flow measuring location.

Grondwater Level Measurement

Water levels will be measured on a monthly basis with the exceptions of December 1993 and January 1994, during which time water levels were not measured.

Sample Preservation

Sample fractions requiring preservation with nitric acid will be preserved at the Geotech field office in Monticello. Nitric acid preservative will initially be shipped to the Geotech field office in accordance to DOT requirements, where it will then remain appropriately stored for use by the sampling team. Following sample collection, those fractions requiring nitric acid preservation will be placed in iced coolers and taken to the field office where they will then be preserved. Sample preservation will occur as soon as possible after collection, on the same day as sample collection, and prior to shipment to the Geotech analytical laboratory in Grand Junction. This revision will alleviate logistical problems associated with the transport of nitric acid to individual sampling locations and applicable DOT requirements.

PROGRAM DIRECTIVE (continued) **Directive No.** MSGRAP-94-01

DIRECTIVE: MSGRAP Surface- and Ground-Water sample collection will be reduced from a quarterly to a semi-annual frequency for MSGRAP FY 1994. The initial MSGRAP FY 1994 sampling event occurred during October 1993. The second and final sampling event for MSGRAP FY 1994 is planned to begin April 25, 1994. The revised sample locations, analyte list, and information pertaining to containers, preservation and holding times for sampling are summarized in the attached Tables 1 through 3 and described in Attachment 1. Revisions adopted for sampling conducted during October 1993 [Program Directive No. MSGRAP-93-01, October 20, 1993] and the April 1994 event are incorporated in Tables 1 through 3. The number of field and equipment blanks remains proportional to the environmental samples obtained as modified by this Program Directive.

Chain of Custody procedures will be conducted at follows...

Custody seals will not be applied to coolers/boxes that are in control of Geotech personnel, (i.e., field samplers or assigned transporters). If samples are transported by subcontract personnel or commercial carrier then custody seal(s) will be applied to the outside of the coolers/boxes containing the samples.

Samples stored at locations whose access is not solely controlled by Geotech personnel will be custody sealed on the outside of the container (cooler/box) as a measure of protection.

Chain of Custody forms will be completed by the field sampling team at the time they are relinquished to other Geotech employees, subcontract employees or commercial carrier personnel. If samples are transported by a member of the field sampling team the custody record may be filled out upon relinquishing the samples at the DOE-GJPO Sample Prep. Lab. Custody records will be container (cooler/box) specific when prepared for subcontract or commercial carrier personnel. Custody records for samples transported by Geotech personnel will account for all samples transported but are not required to be container (cooler/box) specific.

Review and Concurrence (Name/Title):

Sam Campbell — 4-22-94
S.E. Campbell, Field Supervisor — Date

Dint. Ealy — 4/22/94
D.T. Ealey, Laboratory Services Coordinator — Date

Farlie Pearl — 4-22-94
F.A. Pearl, QA Coordinator — Date

Program Manager Approval to Issue:

M E Madson — 4/22/94
M.E. Madson, Monticello Program Manager — Date

DISTRIBUTION: (w/ attachments)
Program Managers Directive Log
Document holders to referenced Planning Documents (distribution through Records Management)

Table 1. MSGRAP FY 1994 (April) Surface- and Ground-Water Sampling Locations

Area	Matrix	Sample Location	Sampling Technique
Upgradient	Surface Water	SW92-01 SW92-02 SW92-03	Submersion of sample bottle, disposable sampler, peristaltic pump
Upgradient	Ground Water	92-01 92-05[1] 92-02 92-06 92-03 92-13 92-04	Bladder pump, peristaltic pump, submersible pump, bailer
On-site	Surface Water	W-2 Carbonate Seep North Drainage SW92-04 SW92-05	Submersion of sample bottle, disposable sampler, peristaltic pump
On-site	Ground Water	82-30B[1] 82-40A 82-42 82-31BE 93-01 31SW91-03[1] 31SW91-14[1] 31SW91-23[2]	Bladder pump, peristaltic pump, submersible pump, bailer
Downgradient	Surface Water	W-4 Sorenson Site Montezuma Canyon SW92-06 SW92-07 SW92-08 SW92-09	Submersion of sample bottle, disposable sampler, peristaltic pump
Downgradient	Ground Water	82-07 92-09 83-70 92-10 88-85[1] 92-11 92-07 92-12 92-08 93-205	Bladder pump, peristaltic pump, submersible pump, bailer

[1] Sample to include analysis for organic compounds, April 1994.
[2] Sample to include analysis for nitrite.

Table 2. MSGRAP FY 1994 (April) Sample Containe reservation, Holding Times, and Analytical Procedures

Analytical Parameter	Matrix	Container Type/Size[a]	Preservation	Holding Time	Analytical Method[b]
TCL Volatile Organics	Water	Glass with Teflon Septa/3@ 40 mL (amber preferred)	~~No Residual Chlorine~~ Conc. HCL to pH <2; Cool to 4°C ~~Residual Chlorine — $Na_2S_2O_3$ to 0.008%; Cool to 4°C~~	14 Days	Geotech Method BB-1; EPA Method 8240 and 8260
TCL SemiVolatile Organics	Water	Glass with Teflon Lined Cap/2 to 6 L (amber preferred)	~~No Residual Chlorine~~ Cool to 4°C ~~Residual Chlorine — $Na_2S_2O_3$ to 0.008%; Cool to 4°C~~	Extr. 7 Days; Anal. 40 Days	Geotech Method BB-2; EPA Method 8270
Polychlorinated Biphenyls	Water	Glass with Teflon Lined Cap/1 L (amber preferred)	Cool to 4°C	Extr. 7 Days Anal. 40 Days	Geotech Method AA-4; EPA Method 8080
Pesticides (from same sample bottle as PCBs)	Water	Glass with Teflon Lined Cap (amber preferred)	Cool to 4°C	Extr. 7 Days Anal. 40 Days	Geotech Method AA-4; EPA Method 8080
Chlorinated Herbicides	Water	Glass with Teflon Lined Cap/1 L (amber preferred)	Cool to 4°C	Extr. 7 Days Anal. 40 Days	Geotech Method AA-3; EPA Method 8150
~~TCL~~ Metals[d] (Ag,Al,As,Ba, ~~Be~~,Cd,Cr,Cu,Fe,~~Hg~~,Mn,Ni,Pb, ~~Sb~~,Se,Tl,V,Zn, plus B,Mo,~~Sr~~)	Water	HDPE[c]/500 mL Amber Bottle	HNO_3 to pH <2	6 Months	Geotech Methods AS-2[d], AS-3, AS-5[d], and AS-6 EPA Method 6010, 6020, and 7000 Series
Inorganics (Ca,Mg,K,Na) (from same sample bottle as ~~TCL~~ Metals)	Water	HDPE	HNO_3 to pH <2	6 Months	Geotech Method AS-5; EPA Method 6010
~~Inorganics (CN)~~	~~Water~~	~~HDPE/1 L~~	~~NaOH to pH >12; Cool to 4°C; 0.06 grams/L Ascorbic Acid if any Residual Chlorine~~	~~14 Days~~	~~Geotech Method F-8; EPA Method 335.2~~
Inorganics (Cl,F,$SO_4$and NO_2[e])	Water	HDPE/125 mL	Filter through 0.45 µm filter; Cool to 4°C	28 Days	Geotech Method D-3; EPA Method 300
Inorganics (N) as NO_3 + NO_2 ~~(from same sample bottle as Cl, F and SO_4)~~	Water	HDPE/125 mL	Filter through 0.45 µm filter; Cool to 4°C H_2SO_4 to pH <2	~~48 Hours~~ 28 Days	Geotech Method D-3; EPA Method 300
Inorganics (NH_4)	Water	HDPE/125 mL	Filter through 0.45 µm filter; H_2SO_4 to pH <2	28 Days	Geotech Method F-6; EPA Method 350.1

[a]Sample volumes may vary according to laboratory requirements.
[b]Geotech methods are described in the following Geotech manuals: "Analytical Chemistry Laboratory Administrative Plan and Quality Control Procedures and "Analytical Chemistry Laboratory Handbook of Analytical and Sample Preparation Procedures.
[c]HDPE = High Density Polyethylene
[d]As & Se will be analyzed according to Geotech Methods AS-2 and AS-5.
[e]Nitrite sample will be collected at monitor well 31SW91-23 only, collection will be from same bottle as Cl, F, and SO_4 (i.e., HDPE 125 mL, filtered, cooled and having a 48 hour holding time

Table 2 (continued). MSGRAP FY 1994 (April) Sample Containers, Preservation, Holding Times, and Analytical Procedures

Analytical Parameter	Matrix	Container Type/Size[a]	Preservation	Holding Time	Analytical Method[b]
Total Dissolved Solids (filterable residue)	Water	HDPE[c]/125 mL	Cool to 4°C	7 Days	EPA Method 160.1
Gross Alpha/Gross Beta	Water	HDPE/1 L	Filter through 0.45 µm filter; HNO_3 to pH <2	6 Months	Geotech Method RC-3
Radium-226	Water	HDPE/3 @ 1 L	Filter through 0.45 µm filter; HNO_3 to pH <2	6 Months	Geotech Method RC-5
Radium-228 (from same sample bottles as Ra-226)	Water	HDPE	Filter through 0.45 µm filter; HNO_3 to pH <2	6 Months	Geotech Method RC-5
Radon-222	Water	Glass with Teflon Septa/3 @ 40 mL	Cool to 4°C	not established	Geotech Method RC-17
Uranium-234	Water	HDPE/1 L	Filter through 0.45 µm filter; HNO_3 to pH <2	6 Months	Geotech Method RC-1
Uranium-238 (from same sample bottle as U-234)	Water	HDPE	Filter through 0.45 µm filter; HNO_3 to pH <2	6 Months	Geotech Method RC-1
Thorium-230 (from same sample bottle as U-234)	Water	HDPE	Filter through 0.45 µm filter; HNO_3 to pH <2	6 Months	Geotech Method RC-1
Thorium-232 (from same sample bottle as U-234)	Water	HDPE	Filter through 0.45 µm filter; HNO_3 to pH <2	6 Months	Geotech Method RC-1
Lead-210	Water	HDPE/1 L	Filter through 0.45 µm filter; HNO_3 to pH <2	6 Months	Geotech Method RC-6
Polonium-210	Water	HDPE/1 L	Filter through 0.45 µm filter; HNO_3 to pH <2	6 Months	Geotech Method RC-2

[a]Sample volumes may vary according to laboratory requirements.
[b]Geotech methods are described in the following Geotech manuals: "Analytical Chemistry Laboratory Administrative Plan and Quality Control Procedures" and "Analytical Chemistry Laboratory Handbook of Analytical and Sample Preparation Procedures."
[c]HDPE = High Density Polyethylene

Table 3. Sample Analyses and Laboratory Reporting Limits

Analytical Parameter	Laboratory Reporting Limit[a] (µg/L)	Analytical Method
Volatile Organic Compounds (VOCs)		Geotech Method[b] BB-1;
Target Compound List (TCL)		(EPA Method[c] 8240 or 8260)
Acetone	2	
Benzene	1	
Bromodichloromethane	1	
Bromoform	1	
Bromomethane	2	
2-Butanone	2	
Carbon disulfide	1	
Carbon tetrachloride	1	
Chlorobenzene	1	
Chlorodibromomethane	1	
Chloroethane	2	
Chloroform	1	
Chloromethane	2	
1,1-Dichloroethane	1	
1,2-Dichloroethane	1	
1,1-Dichloroethene	1	
trans-1,2-Dichloroethene	1	
1,2-Dichloropropane	1	
cis-1,3-Dichloropropene	1	
trans-1,3-Dichloropropene	1	
Ethyl benzene	1	
2-Hexanone	2	
Methylene chloride	1	
4-Methyl-2-pentanone	2	
Styrene	1	
1,1,2,2-Tetrachloroethane	1	
Tetrachloroethene	1	
Toluene	1	
1,1,1-Trichloroethane	1	
1,1,2-Trichloroethane	1	
Trichloroethene	1	
Vinyl acetate	2	
Vinyl chloride	2	
Xylene	1	

[a]The detection limits depend on sample types and matrix.
[b]Geotech Methods listed are Geotech SOPs for the EPA Method listed.
[c]EPA Method 8260 meets or exceeds EPA Method 8240 in precision and accuracy.

Table 3 (continued). Sample Analyses and Laboratory Reporting Limits

Analytical Parameter	Laboratory Reporting Limit[a] (µg/L)	Analytical Method
Semivolatile Organic Compounds (SemiVOCs) (TCL)		Geotech Method[b] BB-2; (EPA Method 8270)
Acenaphthene	10	
Acenaphthylene	10	
Anthracene	10	
Benzoic acid	50	
Benzo(a)anthracene	10	
Benzo(b)fluoranthene	10	
Benzo(k)fluoranthene	10	
Benzo(g,h,i)perylene	10	
Benzo(a)pyrene	10	
Benzyl alcohol	10	
Bis(2-chloroethoxy)methane	10	
Bis(2-chloroethyl)ether	10	
Bis(2-chloroisopropyl)ether	10	
Bis(2-ethylhexyl)phthalate	10	
4-Bromophenyl phenylether	10	
Butyl benzyl phthalate	10	
4-Chloroaniline	10	
2-Chloronaphthalene	10	
4-Chloro-3-methylphenol	10	
2-Chlorophenol	10	
4-Chlorophenyl phenyl ether	10	
Chrysene	10	
Dibenz(a,h)anthracene	10	
Dibenzofuran	10	
Di-n-butylphthalate	10	
1,2-Dichlorobenzene	10	
1,3-Dichlorobenzene	10	
1,4-Dichlorobenzene	10	
3,3'-Dichlorobenzidine	20	
2,4-Dichlorophenol	10	
Diethylphthalate	10	
2,4-Dimethylphenol	10	
Dimethylphthalate	10	
4,6-Dinitro-2-methylphenol	50	
2,4-Dinitrophenol	50	

[a]The detection limits depend on sample types and matrix.
[b]Geotech Methods listed are Geotech SOPs for the EPA Method listed.

Table 3 (continued). Sample Analyses and Laboratory Reporting Limits

Analytical Parameter	Laboratory Reporting Limit[a] (µg/L)	Analytical Method
SemiVOCs (TCL)		Geotech Method[b] BB-2; (EPA Method 8270)
2,4-Dinitrotoluene	10	
2,6-Dinitrotoluene	10	
Di-n-octylphthalate	10	
Fluoranthene	10	
Fluorene	10	
Hexachlorobenzene	10	
Hexachlorobutadiene	10	
Hexachlorocyclopentadiene	10	
Hexachloroethane	10	
Indeno(1,2,3-cd)pyrene	10	
Isophorone	10	
2-Methylnaphthalene	10	
2-Methylphenol	10	
4-Methylphenol	10	
Naphthalene	10	
2-Nitroaniline	50	
3-Nitroaniline	50	
4-Nitroaniline	50	
Nitrobenzene	10	
2-Nitrophenol	10	
4-Nitrophenol	50	
N-Nitroso-di-n-dipropylamine	10	
N-Nitrosodiphenylamine	10	
Pentachlorophenol	50	
Phenanthrene	10	
Phenol	10	
Pyrene	10	
1,2,4-Trichlorobenzene	10	
2,4,5-Trichlorophenol	50	
2,4,6-Trichlorophenol	10	
Pesticides/PCBs		Geotech Method[b] AA-4; (EPA Method 8080)
Aldrin	0.05	
Alpha-BHC	0.05	

[a]The detection limits depend on sample types and matrix.
[b]Geotech Methods listed are Geotech SOPs for the EPA Method listed.

Table 3 (continued). Sample Analyses and Laboratory Reporting Limits

Analytical Parameter	Laboratory Reporting Limit[a] (µg/L)	Analytical Method
Pesticides/PCBs (continued)		Geotech Method[b] AA-4; (EPA Method 8080)
Beta-BHC	0.05	
Delta-BHC	0.05	
Gamma-BHC (lindane)	0.05	
Alpha-Chlordane	0.05	
Gamma-Chlordane	0.05	
4,4'-DDD	0.10	
4,4'-DDE	0.10	
4,4'-DDT	0.10	
Dieldrin	0.10	
Endosulfan I	0.05	
Endosulfan II	0.10	
Endosulfan Sulfate	0.10	
Endrin	0.10	
Endrin Aldehyde	0.10	
Heptachlor	0.05	
Heptachlor Epoxide	0.05	
Methoxychlor	0.5	
Toxaphene	1.0	
Aroclor 1016	0.5	
Aroclor 1221	0.5	
Aroclor 1232	0.5	
Aroclor 1242	0.5	
Aroclor 1248	0.5	
Aroclor 1254	1.0	
Aroclor 1260	1.0	
Herbicides		Geotech Method[b] AA-3 (EPA Method 8150)
2,4-D	1.2	
2,4-DB	0.91	
2,4,5-T	0.20	
2,4,5-TP (Silvex)	0.17	
Dalapon	5.8	
Dichloroprop	0.65	

[a]The detection limits depend on sample types and matrix.
[b]Geotech Methods listed are Geotech SOPs for the EPA Method listed.

Table 3 (cont). MSGRAP FY 1994 (April) Sample Analyses and Laboratory Reporting Limits

Analytical Parameter	Laboratory Reporting Limit[a] (mg/L)	Analytical Method
Metals		Geotech Methods[b] AS-2, AS-3, AS-5, AS-6, and F-8 (EPA Methods 6010, 6020, 7000 Series, and 335.2)
Aluminum	0.10	
~~Antimony~~	~~0.060~~	
Arsenic[c]	0.010	
Barium	0.10	
~~Beryllium~~	~~0.005~~	
Boron	0.1	
Cadmium	0.005	
Chromium	0.010	
Copper	0.025	
~~Cyanide~~	~~0.020~~	
Iron	0.050	
Lead	0.005	
Manganese	0.015	
~~Mercury~~	~~0.0002~~	
Molybdenum	0.050	
Nickel	0.040	
Selenium[c]	0.005	
Silver	0.010	
~~Strontium~~	~~0.01~~	
Thallium	0.010	
Uranium	0.005	
Vanadium	0.050	
Zinc	0.020	
Total Dissolved Solids	10.0	EPA Method 160.1
Major Anions		Geotech Method[b] D-3 (EPA Method 300)
Chloride	1.0	
Sulfate	0.2	
Fluoride	0.2	
Nitrate	0.2	
Nitrite[d]	0.2	

[a]The detection limits depend on sample types and matrix.
[b]Geotech Methods listed are Geotech SOPs for the EPA Method listed.
[c]Arsenic & Selenium to be analyzed by Methods AS-2 and AS-5, April 1994.
[d]Sample collected at monitoring well 31SW91-23 only.

Table 3 (cont.). MSGRAP FY 1994 (April) Sample Analyses and Laboratory Reporting Limits

Analytical Parameter	Laboratory Reporting Limit[a]	Analytical Method
Major Cations	mg/L	Geotech Methods[b] F-6 and AS-5; (EPA Methods 350.1 6010)
Ammonium	0.02	
Calcium	1.0	
Magnesium	1.0	
Potassium	1.0	
Sodium	1.0	
Radionuclides	pCi/L	Geotech Methods RC-3 RC-6, RC-2, RC-5, RC-1, RC-17
Gross alpha	1.0	
Gross beta	1.0	
Lead-210	2.0	
Polonium-210	0.5	
Radium-226	0.5	
Radium-228	1.0	
Thorium-230	0.3	
Thorium-232	0.3	
Uranium-234, Uranium-238	0.3	
Radon-222	300	

[a]The detection limits depend on sample types, matrix, and counting time for radionuclides.

[b]Geotech Methods listed are Geotech SOPs for the EPA Method listed.

PROGRAM DIRECTIVE

Monticello Mill Tailings Site - MSGRAP Directive **Directive No.** MSGRAP-94-02

INITIATED BY: Deborah L. Richardson, MSGRAP Project Manager

EFFECTIVE DATE: October 1, 1994 **EXPIRATION DATE:** September 30, 1995

SUBJECTS: (1) Additional groundwater sampling location; (2) additional surface water sampling locations; (3) additional surface water and groundwater sampling tasks; (4) sample custody tracking form; and, (5) summary of other revisions pertaining to FY 1995 groundwater and surface water sampling/monitoring activities.

JUSTIFICATION FOR PROGRAM DIRECTIVE AND ASSOCIATED NEW TASK CHANGES:

(1) One additional groundwater sample location has been included to evaluate water quality in a potential area of concern located on the millsite near its northwest boundary.

(2) Three additional off-site groundwater seeps will be sampled to evaluate their potential impact on on-site surface water and/or groundwater quality.

(3) The USEPA and State of Utah conducted an audit of groundwater and surface water sampling activities during April 1993. Certain audit recommendations to be implemented by Geotech will require additional work tasks that are either not specified in the project documents or not specifically detailed in Geotech procedures documents.

(4) The revised sample custody tracking form will eliminate duplication of effort in existing sample collection/custody documentation.

(5) DOE-GJPO, DOE-HQ, EPA Region VIII, and State of Utah concurrence to reduce the sampling frequency, sampled locations and the analyte list on the basis of a preliminary review of the data from the baseline sampling performed during FY 1993.

ORGANIZATION(S) AFFECTED: Field Samplers (Environmental Sciences, Environmental Support Operations, and Field Services), DOE-GJPO Analytical Laboratory, Construction Management (Millsite Access and Maintenance), Project Health and Safety support.

PLANS, MANUALS, AND PROCEDURES AFFECTED: The following project documents are affected by the changes:

P-GJPO-751, MMTS OU III, Surface- and Ground-Water RI/FS Work Plan
P-GJPO-752, MMTS OU III, Surface- and Ground-Water RI/FS Field Sampling Plan
P-GJPO-123.1, MMTS OU III, Surface- and Ground-Water RI/FS QA Project Plan

PROGRAM DIRECTIVE (continued) **Directive No.** MSGRAP-94-02

Details of specific sections, pages and paragraphs to be revised are not presented herein. The summary information and tables provided in the Directive will be sufficient to guide field and laboratory personnel in obtaining and analyzing the samples. There are no changes required to current procedures as a result of this directive. Some procedures cited in the project documents may not be used at this time.

DIRECTIVE: MSGRAP Surface- and Ground-Water sample collection was reduced from a quarterly to a semi-annual frequency for MSGRAP FY 1994. The revised schedule applies also to FY 1995. The initial MSGRAP FY 1995 sampling event is scheduled to begin October 3, 1994. The second and final sampling event for MSGRAP FY 1995 is planned for April 1995. All task revisions pertaining to FY 1995 water sample collection and analysis, stream flow gaging, and water level monitoring, are summarized in Attachments 1 and 2, and Tables 1 through 3. These Attachments and Tables are a compilation of revisions detailed in Directives MSGRAP-93-01 and MSGRAP-94-01, as well as new task changes identified since Directive MSGRAP-94-01 (April 22, 1994).

Attachment 2 includes USEPA audit recommendations and the Geotech responses in which additional work tasks to be implemented during FY 1995 are identified.

Review and Concurrence (Name/Title):

S.E. Campbell, Field Supervisor — Date 9/26/94

D.T. Ealey, Laboratory Services Coordinator — Date 9/26/94

F.A. Pearl, QA Coordinator — Date 9-26-94

Program Manager Approval to Issue:

M.E. Madson, Monticello Program Manager — Date 9/26/94

DISTRIBUTION: (w/ attachments)
Program Managers Directive Log
Document holders to referenced Planning Documents (distribution through Records Management)
Records file MSGW 1.14

ATTACHMENT 1
Revisions to Sampling Program

This Attachment to Program Directive MSGRAP-94-02 summarizes revisions to the surface- and groundwater sampling program being implemented under the *Monticello Mill Tailings Site* (MMTS) *Operable Unit III, Surface- and Ground Water Remedial Investigation/Feasibility Study Work Plan, Field Sampling Plan, and Quality Assurance Project Plan*, September 1992. The changes detailed below are necessary or appropriate based on the results of the recently completed surface water and groundwater baseline characterization (FY 1993) and FY 1994 monitoring/characterization efforts. The revised sampling locations and analyte lists for FY 1995, as well as general sample collection, handling, and analytical information are summarized in the accompanying Tables 1 through 3.

Revised Ground Water and Surface Water Sampling Frequency/Schedule

Surface water and ground water sampling will be conducted on a semi-annual basis during FY 1995. The initial sampling event for FY 1995 is scheduled to begin October 3, 1994. The second and final sampling event for FY 1995 is scheduled for April 1995.

Sampling and Analysis for Organic Compounds

Analysis for organic compounds in ground water samples will be conducted on an annual basis during FY 1995. The annual sampling and analysis for organic compounds will occur during the April 1995 sampling event. The annual sampling for organic compounds is to include one location upgradient of the MMTS, three MMTS locations, and one downgradient location from among the established sampling locations (Table 1). Ground water samples collected for analysis of organic compounds must be obtained from monitoring wells completed in the upper flow system. The specific wells that will include analysis for organic compounds will be selected prior to the April 1995 sampling event.

Additional sampling and analysis for organic compounds may be required should evidence of organic contamination be uncovered during site construction activities.

Sampling and Analysis for Inorganic Analytes

Analysis for antimony, beryllium, cyanide, mercury, and strontium was discontinued during FY 1994 and will also be discontinued during FY 1995. Nitrite analysis will be discontinued for all surface water and groundwater samples, with one exception: monitoring well 31SW91-23 will include analysis for nitrite during FY 1995 (Table 2). If results indicate that nitrite concentrations are increasing at this location, additional downgradient monitoring wells will be considered for nitrite analysis in subsequent sampling rounds.

Analysis for arsenic and selenium was performed according to Geotech methods AS-2 (graphite furnace atomic absorption) and AS-5 (inductively coupled plasma emission spectrometry) for the April 1994 event. Prior to that, analysis for arsenic and selenium was performed according to Geotech Method AS-2 only. Results of the April 1994 event determined that Method AS-5 better achieves project data quality objectives for arsenic and selenium while reducing analytical costs and eliminating ambiguity in GFAA results. Method AS-5 will replace Method AS-2 for arsenic and selenium analysis during FY 1995 sampling rounds,

Characterization, plus two additional sites. Added sites are: SW94-01, located approximately 1000 feet south of the Vega/Montezuma Creek confluence; and, SW94-02, located on-site near the eastern edge of the BLM complex and west of the Carbonate Pile, between locations SW92-03 and SW92-04. Site SW94-01 will provide stream flow data for evaluating sedimentation in the upper reach of Montezuma Canyon. Site SW94-02 will be used in evaluating influent/effluent conditions on the millsite upstream of the tailings piles.

Surface water temperature will be measured and recorded on a monthly basis at each stream flow measuring location.

Water Sample Custody Tracking Form

The form currently used to track sample custody will be replaced by form GJPO 1512, rev. 11/92. An example of the form that will be used during FY 1995 is included in Geotech Standard Practice for Chain-of-Sample-Custody Control and Physical Security of Samples [GN-9(P), 4/92, rev.2]. This form will replace form GJPO 1840, rev. 11/91 , which was specified for use in the project documents.

Chain of Custody Procedures

Custody seals will not be applied to coolers/boxes that are in control of Geotech personnel, (i.e., field samplers or assigned transporters). If samples are transported by subcontract personnel or commercial carrier then custody seal(s) will be applied to the outside of the coolers/boxes containing the samples.

Samples stored at locations whose access is not solely controlled by Geotech personnel will be custody sealed on the outside of the container (cooler/box) as a measure of protection.

Chain of Custody forms will be completed by the field sampling team at the time they are relinquished to other Geotech employees, subcontract employees or commercial carrier personnel. If samples are transported by a member of the field sampling team the custody record may be filled out upon relinquishing the samples at the DOE-GJPO Sample Preparation Laboratory. Custody records will be container (cooler/box) specific when prepared for subcontract or commercial carrier personnel. Custody records for samples transported by Geotech personnel will account for all samples transported but are not required to be container (cooler/box) specific.

Table 2. Sample Containers, Preservation, Holding Times, and Analytical Procedures: October 1994, MSGRAP FY 1995.

Analytical Parameter	Matrix	Container Type/Size[a]	Preservation	Holding Time	Analytical Method[b]
~~TCL Volatile Organics~~	~~Water~~	~~Glass with Teflon Septa/3@ 40 mL (amber preferred)~~	~~No Residual Chlorine - Conc. HCL to pH <2; Cool to 4°C~~ ~~Residual Chlorine - $Na_2S_2O_3$ to 0.008%; Cool to 4°C~~	~~14 Days~~	~~Geotech Method BB-1; EPA Method 8240 and 8260~~
~~TCL SemiVolatile Organics~~	~~Water~~	~~Glass with Teflon Lined Cap/2 to 6 L (amber preferred)~~	~~No Residual Chlorine - Cool to 4°C~~ ~~Residual Chlorine - $Na_2S_2O_3$ to 0.008%; Cool to 4°C~~	~~Extr. 7 Days; Anal. 40 Days~~	~~Geotech Method BB-2; EPA Method 8270~~
~~Polychlorinated Biphenyls~~	~~Water~~	~~Glass with Teflon Lined Cap/1 L (amber preferred)~~	~~Cool to 4°C~~	~~Extr. 7 Days Anal. 40 Days~~	~~Geotech Method AA-4; EPA Method 8080~~
~~Pesticides (from same sample bottle as PCBs)~~	~~Water~~	~~Glass with Teflon Lined Cap (amber preferred)~~	~~Cool to 4°C~~	~~Extr. 7 Days Anal. 40 Days~~	~~Geotech Method AA-4; EPA Method 8080~~
~~Chlorinated Herbicides~~	~~Water~~	~~Glass with Teflon Lined Cap/1 L (amber preferred)~~	~~Cool to 4°C~~	~~Extr. 7 Days Anal. 40 Days~~	~~Geotech Method AA-3; EPA Method 8150~~
~~TCL~~ Metals[d] (Ag,Al,As,Ba, ~~Be~~,Cd,Cr,Cu,Fe,~~Hg~~,Mn,Ni,Pb, ~~Sb~~,Se,Tl,V,Zn, plus B,Mo,~~Sr~~)	Water	HDPE[c]/500 mL Amber Bottle	HNO_3 to pH <2	6 Months	Geotech Methods ~~AS-2~~[d], AS-3, AS-5[d], and AS-6 EPA Method 6010, 6020, and 7000 Series
Inorganics (Ca,Mg,K,Na) (from same sample bottle as ~~TCL~~ Metals)	Water	HDPE	HNO_3 to pH <2	6 Months	Geotech Method AS-5; EPA Method 6010
~~Inorganics (CN) Method F-8;~~	~~Water~~	~~HDPE/1 L~~	~~NaOH to pH >12; Cool to 4°C;~~ ~~0.06 grams/L Ascorbic Acid if any Residual Chlorine~~	~~14 Days~~	~~Geotech EPA Method 335.2~~
Inorganics (Cl,F,$SO_4$and NO_2[e])	Water	HDPE/125 mL	Filter through 0.45 µm filter; Cool to 4°C	28 Days[e]	Geotech Method D-3; EPA Method 300
Inorganics NO_3 + NO_2 as N ~~(from same sample bottle as Cl, F and SO_4.)~~	Water	HDPE/125 mL	Filter through 0.45 µm filter; Cool to 4°C H_2SO_4 to pH <2	~~48 Hours~~ 28 Days	Geotech Method D-3; EPA Method 300
Inorganics (NH_4)	Water	HDPE/125 mL	Filter through 0.45 µm filter; H_2SO_4 to pH <2	28 Days	Geotech Method F-6; EPA Method 350.1

[continued]

Table 3 Sample Analyses and Laboratory Reporting Limits
October 1994, MSGRAP FY 1995

Analytical Parameter	Laboratory Reporting Limit[a] (mg/L)	Analytical Method
Metals		Geotech Methods[b] ~~AS-2~~,
Aluminum	0.10	AS-3, AS-5, AS-6, and F-8
~~Antimony~~	~~0.060~~	(EPA Methods 6010, 6020,
Arsenic[c]	0.010	7000 Series, and 335.2)
Barium	0.10	
~~Beryllium~~	~~0.005~~	
Boron	0.1	
Cadmium	0.005	
Chromium	0.010	
Copper	0.025	
~~Cyanide~~	~~0.020~~	
Iron	0.050	
Lead	0.005	
Manganese	0.015	
~~Mercury~~	~~0.0002~~	
Molybdenum	0.050	
Nickel	0.040	
Selenium[c]	0.005	
Silver	0.010	
~~Strontium~~	~~0.01~~	
Thallium	0.010	
Uranium	0.005	
Vanadium	0.050	
Zinc	0.020	
Total Dissolved Solids	10.0	EPA Method 160.1
Major Anions		Geotech Method[b] D-3
Chloride	1.0	(EPA Method 300)
Sulfate	0.2	
Fluoride	0.2	
Nitrate	0.2	
Nitrite[d]	0.2	

[a]The detection limits depend on sample types and matrix.
[b]Geotech Methods listed are Geotech SOPs for the EPA Method listed.
[c]Arsenic & Selenium to be analyzed by Methods ~~AS-2 and~~ AS-5~~, April 1994.~~
[d]Sample collected at Well 31SW91-23 only.

ATTACHMENT 2

Summary of Geotech Responses to USEPA April 1993 Audit Recommendations

The following sections summarize additional tasks that Geotech will implement during FY 1995 surface water and groundwater sampling rounds in response to USEPA audit recommendations (attached).

Upgradient Sampling Locations

At upgradient sampling locations, the sampling area will be delineated with tape; however, the ground surface will not be covered with plastic and the purge water and decontamination rinse water generated at these sites will not be contained. The rationale for this is that existing data collected at upgradient locations indicates that the water is not contaminated, and therefore poses no contamination problem to the ground surface. Purge water and decontamination rinse water generated at monitoring well sites will be discharged on the ground away from the well. Decontamination rinse water generated at upgradient surface water sites will be released back into the creek. In addition, according to existing health and safety procedures, boot covers will not be worn in this area.

Millsite Sampling Locations

At millsite sampling locations, delineation of the sampling area is not necessary because access to the millsite is controlled at the gates (as noted by Mr. Edmonds). Similarly, the ground surface will not be covered with plastic because this is not required for any millsite activity; contamination is controlled at the gates. Purge water and decontamination rinse water generated at these site will be containerized. Decontamination rinse water generated at millsite surface water sites will be released back into the surface water source (creek or seep). In addition, according to existing health and safety procedures, boot covers will be worn on the millsite.

Downgradient Sampling Locations

At downgradient sampling locations that can be driven to, the sampling area will be delineated with tape and the ground surface will be covered with plastic. Where vehicular access is not possible, it is not considered necessary to delineate the sampling area because of the remoteness of the site. Purge water and decontamination rinse water generated at these site will be contained. Decontamination rinse water generated at downgradient surface water sites will be released back into the creek. In addition, according to existing health and safety procedures, boot covers will not be worn in this area.

at millsite surface water sites will be released back into the surface water source (creek or seep). In addition, according to existing health and safety procedures, boot covers will be worn on the millsite.

At downgradient sampling locations that can be driven to, the sampling area will be delineated with tape and the ground surface will be covered with plastic. Where vehicular access is not possible, it is not considered necessary to delineate the sampling area because of the remoteness of the site. Purge water and decontamination rinse water generated at these site will be contained. Decontamination rinse water generated at downgradient surface water sites will be released back into the creek. In addition, according to existing health and safety procedures, boot covers will not be worn in this area.

If you have any questions or concerns, please call me at (303) 248-6007.

Sincerely,

Joel Berlwick
Project Manager

surface water) were not lined with a nonpermeable covering. A nonpermeable covering helps prevent any spillage and/or contamination from entering the vehicles and prevents potential cross-contamination into other sampling locations.

Recommendation: Place a nonpermeable covering over the work areas within the vehicles. Configure the covering so that any spillage can be collected and disposed of properly.

Response: The work surfaces of vehicles will be covered with nonpermeable coverings.

OBSERVATION #4: The site-derived waste (purge water) was disposed of in an area close to the proximity of sample collection. Although this procedure was approved within the Quality Assurance Project Plan, this is not considered an acceptable practice due to potential contamination of surface soils, waters, and subsurface soils/waters. This practice was also observed at the Mill Site (82-30B).

Recommendation: It is recommended that all site-derived waste be containerized and left at the location until analysis of the contents can be conducted so that proper disposal can be determined. It should be noted that the sampling crew stated that future waste products would be taken to a holding pond.

Response: All purge and decontamination water from monitoring well locations on the millsite and downgradient from the millsite will be containerized and disposed of at Pond 3 (if completed) or at one of the onsite ponds (if Pond 3 is not completed). Sufficient data have been collected from upgradient monitoring well locations indicating that the water pumped from these wells is not contaminated and, therefore, will not pose a cross-contamination problem or have a negative impact on the soil. Wastes derived from sampling at these upgradient well locations will be discharged on to the ground away from the well at the time of sampling. Wastes derived from sampling at surface water sampling locations will be discharged back to the surface water source at the time of sampling.

OBSERVATION #5: The sampling crews (surface and ground water) were not wearing protective covering, other than disposable gloves. It is good practice for the sampling crews to wear protective clothing at any sampling location, regardless of whether or not it is upgradient or downgradient of the site. It is even more critical given the fact that the surface water sampling crew was observed adding acid to the sample bottles without regard to splash potential.

Recommendation: All individuals involved in the sampling "area of delineation" must take every precaution to assure their personal protection and prevent contamination of areas outside of the "Hot Zone." This includes wearing the proper clothing and taking the proper precautions to eliminate potential contamination of areas outside the "area of delineation."

Response: The sampling crews will follow all requirements of the project health and safety

Recommendation: Once gloves are removed, they should be disposed of properly so that further contamination will be averted. One suggestion would be to dispose of the gloves in a trash bag.

Response: Used personal protective clothing will be disposed of properly.

OBSERVATION #10: The surface water crew was observed handling sample bottles with and without protective gloves. One individual was observed handling the bottles with protective gloves while the other individual used his bare hands. This is not considered an appropriate practice.

Recommendation: Personnel involved with handling sample bottles at the sample site should wear protective gloves at all times to prevent any potential cross-contamination and for personal protection.

Response: The sampling crews will wear protective gloves during sampling.

OBSERVATION #11: The ground water sampling crew was observed handling sample tubing with gloves that had potentially been contaminated from prior use.

Recommendation: Individuals should properly discard the contaminated gloves prior to handling any type of new tubing or other equipment to prevent potential contamination prior to usage.

Response: Potentially contaminated gloves will be discarded prior to handling new equipment or tubing.

OBSERVATION #12: After the surface water crew prepared the sample bottles with acid preservative, there was a question as to whether or not the bottle of acid was properly sealed. The bottle of acid was not placed into an individual container to prevent any potential problem from leaks or breakage.

Recommendation: Individuals should assure that acid containers are properly sealed and placed into an individual container to prevent any accidental spillage into the vehicle and causing other damage. Sample bottles should also be stored within an impermeable bag and sealed to avoid cross-contamination from sample spillage, to minimize breakage of bottles, and to prevent contaminating the cooler.

Response: All preservative containers and all sample bottles will be properly sealed and packaged to minimize breakage and prevent contamination.

Recommendation: There should be a policy which prohibits anyone from taking any food/drinks into the sampling area. The potential for contamination is very high and could pose a health problem to the individual(s) who drink from the cups/glasses.

Response: No drinks or food items will be allowed in the sampling area.

OBSERVATION #17: There was no indication that the temperature of the coolers was being monitored to ensure that 4 degrees C was maintained prior to analyses.

Recommendation: The coolers containing the samples must be monitored to ensure that the regulatory requirements for temperature control of the samples be maintained. It is suggested that a min-max thermometer be placed within the cooler in such a way as to protect it from breakage during shipment.

Response: The temperature of the coolers is monitored (thermometer is read and temperature recorded) at each sampling location, before transporting the cooler to the laboratory, and at the laboratory during sample receipt.

OBSERVATION #18: During the site clean-up, the sampling crews were observed handling the contaminated trash with their bare hands. This is considered unacceptable due to the potential problems with health and safety of the individuals handling the contaminated trash.

Response: Protective gloves will be worn during site clean-up.

OBSERVATION #19: The procedure for collecting volatile organic compounds from the ground water sampling crew could potentially bias the data. Since there was no check valve to ensure that a steady flow could be obtained during the sampling, the sampler relied on the pump to obtain the needed flow to collect the sample, thus pausing several minutes prior to a collecting a complete sample. Furthermore, the sampler held the collection device directly under the tubing, allowing the flow to directly impact the volatiles within the sample.

Recommendation: The samples should be taken so that during the "water draw," the sample container is tilted at a 45 degree angle during the initial collection and tilted to a 90 degree angle to form a positive meniscus. It is suggested that the sampling crew configure their sampling equipment in such a way that a check valve be placed within the system. This would provide the crew with positive pressure at all times and prevent potential "bubbles" from entering into the tubing which could bias any volatile organic sample results.

Response: The sample container will be held as suggested during sample collection and samples collected for volatile organic compound analysis will be collected during one stroke of the bladder pump, if possible. The sampling equipment will not be modified with check valves because volatile organic compounds are not a concern at this site.

4-19 (4) OUIII AR 576

Program Directive

Program: Monticello Mill Tailings Site—OU III (MSGRAP) **Directive No.:** MSGRAP 94-03

Effective Date: November 10, 1994 **Expiration Date:** N/A (Permanent Change)

Initiated By: Richard N. Morris, Senior Staff Engineer — November 9, 1994 Date

Subject: Change in Sample Location SS94-004

Justification for Directive and Associated Task Changes: While planning fieldwork, Ernie Colunga found that sample location SS94-004 [1984-1987 location 44] fell outside the OU III work area. 1984-87 location 44 was miscoded as falling within the area and was incorrectly selected. Location SS95-004 must be reassigned within the work area to satisfy project objectives.

Organizations Affected: Field Services (surveyors and sampling team members)
Environmental Sciences (geologist and soil scientist)

Plans, Manuals, & Procedures Affected: RUST Geotech Inc., 1994. *Monticello Mill Tailings Site, Operable Unit III, Focused Work Plan for Confirmatory Soil Sampling*. Report P-GJPO-912, U.S. Department of Energy, Grand Junction Projects Office, contract DE-AC04-86ID12584, Grand Junction, CO, draft of October 13, 1994. Affected parts: Table 2-1 (p. 9) and Plate 2 (appended).

Directive: Reassign SS94-004 to 1984-87 location 37 (the next valid site in the random-number sequence). Change the SS94-004 entry in Table 2-1 to: Northing = 9264, Easting = 27795, 1984-87 Location = 37, 1994 Gamma Exposure Rate = 24 μR/h $\leq \gamma \leq$ 97 μR/h, and Estimated No. of Samples = 2. Change Plate 2 to show the new location for SS94-004. Ernie Colunga was orally authorized on November 9, 1994, to have the surveyors stake the new location.

Review and Concurrence:

Bill Merrill, Technical Project Coordinator — 11/10/94 Date

Deborah Richardson, Technical Project Manager — 11/10/94 Date

Program Manager Approval to Issue:

Michael E. Madson, Program Manager — 11/10/94 Date

Distribution:

Program Records Index No. MSGW 1.14
Personnel issued original document (includes internal and external distribution)

PROGRAM DIRECTIVE

Monticello Mill Tailings Site - MSGRAP Directive Directive No. MSGRAP-95-01

INITIATED BY: William G. Merrill, MSGRAP OU III Project Coordinator

EFFECTIVE DATE: ~~October 1, 1994~~ April 10, 1995 EXPIRATION DATE: September 30, 1995

SUBJECTS: Revised surface water discharge monitoring locations and procedures. Revised surface water sampling locations for the Aprill 1995 sampling event. Revision of surface water sample parameter list.

JUSTIFICATION FOR PROGRAM DIRECTIVE AND ASSOCIATED NEW TASK CHANGES:

1. Six surface water discharge measurement sites have been added to the monitoring network since Directive MSGRAP-94-02 (most recent program directive). Monitoring results from these sites will be used to support the OU III hydrologic characterization.

2. Surface water discharge measurement procedures for sites W-2, Carbonate Seep, North Drainage, Upper North Drainage, Pehrson #1, Pehrson #2, and six new sites have been revised. The revised procedures provide greater flexibility to field personnel without compromising data quality.

3. Two surface water sites that were sampled in October 1994 (Pehrson #1 and Upper North Drainage) under Directive MSGRAP-94-02 will not be sampled during the April 1995 water sampling event. Sufficient analytical data has been obtained to characterize water quality at these locations. Pehrson #2, sampled in October 1994 under Directive MSGRAP-94-04, will again be sampled in April 1995 to further assess a potential off-site source of contamination. One new surface water site (Slade Spring) will be sampled during April 1995 to assess the potential impact of its discharge on water quality in Montezuma Creek.

4. The parameter list for surface water samples collected in April 1995 will be revised to include a filtered metals fraction in addition to an unfilterd metals fraction in order to complement the Ecological and Human Health Risk Assessment field sampling programs.

5. The parameter list for ground water and surface water samples collected during the April 1995 event will include analysis for tin and cobalt in the metals fractions. Analytical results for tin and cobalt will support the Ecological and Human Health Risk Assessment field sampling programs.

ORGANIZATION(S) AFFECTED: Field Samplers (Environmental Sciences, Environmental Support Operations, and Field Services), Construction Management (Millsite Access and Maintenance), Project Health and Safety support.

PLANS, MANUALS, AND PROCEDURES AFFECTED: The following project documents are affected by the changes:

P-GJPO-751, MMTS OU III, Surface- and Ground-Water RI/FS Work Plan
P-GJPO-752, MMTS OU III, Surface- and Ground-Water RI/FS Field Sampling Plan
P-GJPO-123.1, MMTS OU III, Surface- and Ground-Water RI/FS QA Project Plan

Details of specific sections, pages and paragraphs to be revised are not presented herein. The summary information and tables provided under the Directive will be sufficient to guide field personnel in obtaining the appropriate measurements and samples.

DIRECTIVE:

1. Six new sites that will be added to the discharge monitoring network are: Slade Spring; Clay Hill Seep; Goodknight Spring; and three locations along Hall's Ditch, including sites Hall 1 near the diversion from Montezuma Creek to Hall's Ditch (west of Highway 161), Hall 2 where Hall's Ditch exits the Millsite (west of the North Drainage site), and Hall 3 approximately 3000 feet east of the Millsite where Hall's Ditch begins to flow north. Table 1 (attached) summarizes the surface water discharge network that will be monitored under this Directive. Figure 1 displays the locations of the new monitoring sites.

2. Surface water discharge at sites Slade Spring, Clay Hill Seep, Goodknight Spring, the three Hall's Ditch locations, W-2, Carbonate Seep, North Drainage, Upper North Drainage, Pehrson #1, and Pehrson #2 will be evaluated as follows: Each site will be visited during each monthly monitoring event, and the presence or absence of water documented in the field book. If the flow at any of these sites is sufficient to allow measurement, then flow rates will be measured in accordance with the procedures specified in the *Monticello Mill Tailings Site, Operable Unit III, Surface- and Ground-Water Remedial Investigation/Feasibility Study—Field Sampling Plan* (P-GJPO-752, September 1992). If flow rates are not sufficient for measurement, then the fact that measurements could not be taken will be documented in the field book.

3. During the April 1995 water sampling event, Pehrson #1 and Upper North Drainage sites will not be sampled. Pehrson #2 will be sampled in the April 1995 event. Slade Spring will be added to the surface water network for sampling during the April 1995 event. The surface water sites that will be sampled in April 1995 are summarized in Table 2.

4. Metals fractions collected from all surface water sites will consist of a filtered sample in addition to an unfiltered sample. The analyte list for the April 1995 event is summarized in Table 3.

5. Tin and cobalt are included as analytes in all ground water and surface water samples collected during the April 1995 event. Tin will be analyzed in accordance with EPA SW-846 6020, with a method detection limit of 5.0 µg/L; cobalt will be analyzed in accordance with CLP Method 200.7, with a method detection limit of 10.0 µg/L.

6. All revisions to the sampling/monitoring program included in Directive MSGRAP-94-02 remain in effect unless modified directly by the above items.

Review and Concurrence (Name/Title):

D.L. Richardson, OU III Technical Project Manager — Date 4/7/95

S. E. Campbell, Field Supervisor — Date 4-6-95

F. A. Pearl, QA Coordinator — Date 4-6-95

D. T. Ealey, Laboratory Services Coordinator — Date 4/6/95

Program Manager Approval to Issue:

W. A. Busby, Monticello Program Manager — Date 4/10/95

DISTRIBUTION: (w/ attachments)
Program Managers Directive Log
Document holders to referenced Planning Documents (distribution through Records Management)
Records file MSGW 1.14

Table 1. Surface Water Discharge Measurement Locations

Area	Surface-Water Discharge Location	
Upgradient	SW92-01	SW92-02
	SW92-03	Hall 1
North Hillside (north of Millsite)	Upper North Drainage	
	Pehrson Seep #1	
	Pehrson Seep #2	
	Caly Hill Seep	
	Hall 2	
Millsite	W-2	SW92-04
	Carbonate Seep	SW92-05
	North Drainage	SW94-02
	Slade Spring	
Downgradient	W-4	SW92-07
	Sorenson Site	SW92-08
	Montezuma Canyon	SW92-09
	SW92-06	SW94-01
	Hall 3	

Table 2

MSGRAP Surface Water and Ground Water Sampling Locations
April 1995

Surface Water

Upgradient	Millsite	Downgradient	Sampling Technique
SW92-01	Carbonate Seep	W-4	Sample bottle immersion, peristaltic pump.
SW92-02	North Drainage	SW92-06	
SW92-03	SW92-04	Sorenson	
Pehrson #2	SW92-05	SW92-07	
	W-2	SW92-08	
	Slade Spring	SW92-09	
		Montezuma Canyon	

Ground Water

Upgradient	Millsite[1]	Downgradient	Sampling Technique
92-01 (ufs)[2]	82-40A (ufs)	82-07 (ufs)	Dedicated bladder pump; or non-dedicated submersible pump, bailer, or peristaltic pump.
92-03 (ufs)	82-42 (ufs)	83-70 (Kd-l/Kbc)	
92-05 (ufs)[3]	82-31BE (ufs)	88-85 (ufs)[3]	
92-02 (Kbc)[4]	93-01 (Kbc)	92-07 (ufs)	
92-04 (Kbc)	31SW91-03 (ufs)	92-08 (ufs)	
92-06 (Kbc)	31SW91-14 (ufs)	92-09 (ufs)	
92-13 (Kd-l)[5]	82-30B (ufs)	92-10 (Kbc)	
93-205 (Kbc)[6]	31SW91-23 (ufs)[7]	92-11 (ufs)	
	201-02 (ufs)	92-12 (Kd-l)	

[1] Three Millsite upper flow system wells of choice to include fractions for organic compounds analysis, April 1995 event.
[2] Upper flow system.
[3] To include fractions for organic compounds analysis, April 1995 event.
[4] Burro Canyon aquifer
[5] Lower Dakota sandstone
[6] Cross-gradient well.
[7] Sample to include fraction for nitrite analysis, April 1995 event.

Table 3. Sample Containers, Preservation, Holding Times, and Analytical Procedures: April 1995.

Analytical Parameter	Matrix	Container Type/Size[a]	Preservation	Holding Time	Analytical Method[b]
TCL Volatile Organics	Water	Glass with Teflon Septa/3@ 40 mL (amber preferred)	~~No Residual Chlorine~~ Conc. HCL to pH <2; Cool to 4°C ~~Residual Chlorine — $Na_2S_2O_3$ to 0.008%; Cool to 4°C~~	14 Days	Geotech Method BB-1; EPA Method 8240 and 8260
TCL SemiVolatile Organics	Water	Glass with Teflon Lined Cap/2 to 6 L (amber preferred)	~~No Residual Chlorine~~ Cool to 4°C ~~Residual Chlorine — $Na_2S_2O_3$ to 0.008%; Cool to 4°C~~	Extr. 7 Days; Anal. 40 Days	Geotech Method BB-2; EPA Method 8270
Polychlorinated Biphenyls	Water	Glass with Teflon Lined Cap/1 L (amber preferred)	Cool to 4°C	Extr. 7 Days Anal. 40 Days	Geotech Method AA-4; EPA Method 8080
Pesticides (from same sample bottle as PCBs)	Water	Glass with Teflon Lined Cap (amber preferred)	Cool to 4°C	Extr. 7 Days Anal. 40 Days	Geotech Method AA-4; EPA Method 8080
Chlorinated Herbicides	Water	Glass with Teflon Lined Cap/1 L (amber preferred)	Cool to 4°C	Extr. 7 Days Anal. 40 Days	Geotech Method AA-3; EPA Method 8150
~~TCL~~ Metals[d] (Ag, Al, As, B, Ba, ~~Be~~, Cd, Co, Cr, Cu, Fe, ~~Hg~~, Mn, Mo, Ni, Pb, ~~Sb~~, Se, Sn, ~~Sr~~, Tl, V, Zn, plus Ca, Mg, K, Na)	Water	HDPE[c]/500 mL Amber Bottle	HNO_3 to pH <2	6 Months	Geotech Methods ~~AC-2~~[d], AS-3, AS-5[d], and AS-6 EPA Method 6010, 6020, and 7000 Series
~~TCL~~ *Metals*[d] *(Ag, Al, As, B, Ba, ~~Be~~, Cd, Co, Cr, Cu, Fe, ~~Hg~~, Mn, Mo, Ni, Pb, ~~Sb~~, Se, ~~Sn~~, ~~Sr~~, Tl, V, Zn, plus Ca, Mg, K, Na)*	*Water*	*HDPE[c]/500 mL Amber Bottle*	*Filter through 0.45µm filter, HNO_3 to pH <2*	*6 Months*	*Geotech Methods ~~AC-2~~[d], AS-3, AS-5[d], and AS-6* EPA Method 6010, 6020 and 7000 Series
~~Inorganics (CN)~~	~~Water~~	~~HDPE/1 L~~	~~NaOH to pH >12; Cool to 4°C; 0.06 grams/L Ascorbic Acid if any Residual Chlorine~~	~~14 Days~~	~~Geotech Method F-8; EPA Method 335.2~~
Inorganics (Cl, F, SO_4 and NO_2[e])	Water	HDPE/125 mL	Filter through 0.45 µm filter; Cool to 4°C	28 Days[e] [48 hours][e]	Geotech Method D-3; EPA Method 300
Inorganics NO_3 + NO_2 as N ~~(from same sample bottle as Cl, F and SO_4)~~	Water	HDPE/125 mL	Filter through 0.45 µm filter; Cool to 4°C H_2SO_4 to pH <2	~~48 Hours~~ 28 Days	Geotech Method D-3; EPA Method 300
Inorganics (NH_4)	Water	HDPE/125 mL	Filter through 0.45 µm filter; H_2SO_4 to pH <2	28 Days	Geotech Method F-6; EPA Method 350.1

[continued]

Table 3 (continued). Sample Containers, Preservation, Holding Times, and Analytical Procedures: April 1995.

Analytical Parameter	Matrix	Container Type/Size[a]	Preservation	Holding Time	Analytical Method[b]
Total Dissolved Solids (filterable residue)	Water	HDPE[c]/125 mL	Cool to 4°C	7 Days	EPA Method 160.1
Gross Alpha/Gross Beta	Water	HDPE/1 L	Filter through 0.45 µm filter; HNO_3 to pH <2	6 Months	Geotech Method RC-3
Radium-226	Water	HDPE/3 @ 1 L	Filter through 0.45 µm filter; HNO_3 to pH <2	6 Months	Geotech Method RC-5
Radium-228 (from same sample bottles as Ra-226)	Water	HDPE	Filter through 0.45 µm filter; HNO_3 to pH <2	6 Months	Geotech Method RC-5
Radon-222	Water	Glass with Teflon Septa/3 @ 40 mL	Cool to 4°C	not established	Geotech Method RC-17
Uranium-234	Water	HDPE/1 L	Filter through 0.45 µm filter; HNO_3 to pH <2	6 Months	Geotech Method RC-1
Uranium-238 (from same sample bottle as U-234)	Water	HDPE	Filter through 0.45 µm filter; HNO_3 to pH <2	6 Months	Geotech Method RC-1
Thorium-230 (from same sample bottle as U-234)	Water	HDPE	Filter through 0.45 µm filter; HNO_3 to pH <2	6 Months	Geotech Method RC-1
Thorium-232 (from same sample bottle as U-234)	Water	HDPE	Filter through 0.45 µm filter; HNO_3 to pH <2	6 Months	Geotech Method RC-1
Lead-210	Water	HDPE/1 L	Filter through 0.45 µm filter; HNO_3 to pH <2	6 Months	Geotech Method RC-6
Polonium-210	Water	HDPE/1 L	Filter through 0.45 µm filter; HNO_3 to pH <2	6 Months	Geotech Method RC-2

[a] Sample volumes may vary according to laboratory requirements.
[b] Geotech methods are described in the following Geotech manuals: "Analytical Chemistry Laboratory Administrative Plan and Quality Control Procedures and "Analytical Chemistry Laboratory Handbook of Analytical and Sample Preparation Procedures.
[c] HDPE = High Density Polyethylene
[d] As & Se will be analyzed according to Geotech Method ~~AS-2 and~~ AS-5. *Cobalt will be analyzed according to CLP Method 200.7, MDL = 10.0 µg/L. Tin will be analyzed according to EPA SW-846 6020, MDL = 5.0 µg/L.*
[e] Nitrite sample will be collected at monitor well 31SW91-23 only, analysis will be from same bottle as Cl, F, and SO_4 (i.e., HDPE 125 mL, filtered, cooled and having a 48 hour holding time.

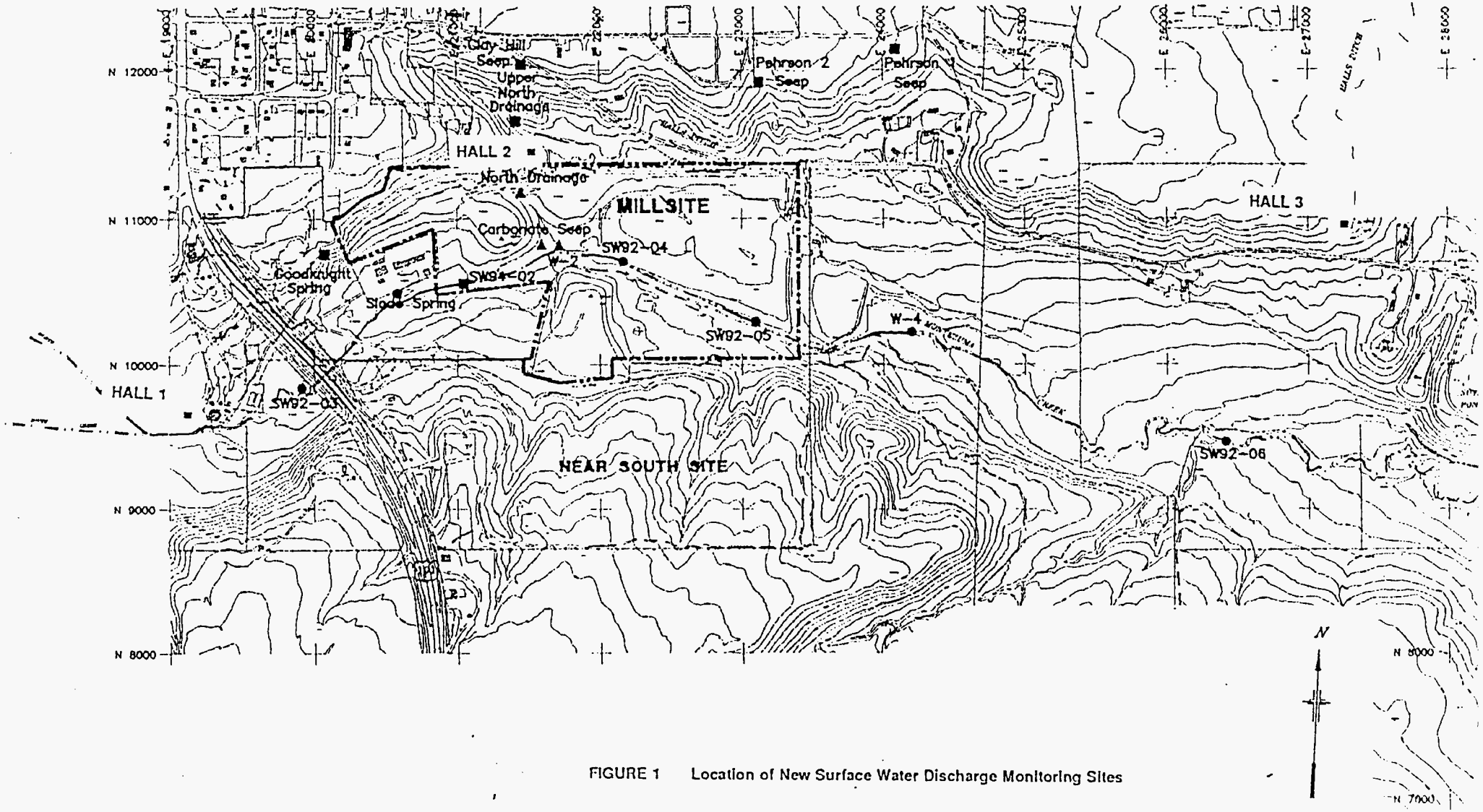


FIGURE 1 Location of New Surface Water Discharge Monitoring Sites

4-20-6

PROGRAM DIRECTIVE

Monticello Operable Unit III Directive — Directive No. MSGRAP 95-02

PROGRAM MANAGER: Wanda Busby

DATE: May 23, 1995

SUBJECT: Change in sampling and analytical procedures for cliff swallow sampling to support of the Operable Unit III ecological risk assessment.

JUSTIFICATION FOR PROGRAM DIRECTIVE AND ASSOCIATED TASK CHANGES:

1. Pre-sampling surveillance has indicated that ropes and/or ladders would not be practical for accessing the cliff swallow nests for sampling. Environmental Services and Health and Safety personnel have identified a more practical sampling method.

2. Pre-sampling surveillance has indicated that cliff swallow numbers in the sampling areas may be insufficient for the sampling and analysis approach outlined in the Revised Draft Operable Unit III Work Plan, Field Sampling Plan, and Quality Assurance Project Plan. EPA and the State of Utah recommended that analytical approach be changed to accommodate low numbers of cliff swallows.

ORGANIZATIONS AFFECTED: Environmental Services; Field Services; Health, Safety, and Security, Laboratory Services

PLANS, MANUALS, AND PROCEDURES AFFECTED: Revised Draft Operable Unit III Work Plan, Field Sampling Plan, and Quality Assurance Project Plan

DIRECTIVE:

- Cliff swallow nests will be selected for sampling as described in the Revised Draft Operable Unit III RI/FS Work Plan, Field Sampling Plan, and Quality Assurance Project Plan.

- Cliff swallow nestlings will be collected by knocking down nests with a long pole. A long-handled net will be used to catch the nests and their contents.

- Cliff swallow nestlings will be dispatched as described in the Revised Draft Operable Unit III RI/FS Work Plan, Field Sampling Plan, and Quality Assurance Project Plan.

- Specimens will be plucked, removing and discarding 90% of their large, outer feathers.

- Specimens will be dissected:
  - Stomachs and intestinal tracts will be frozen and archived.
  - Livers will be pooled to form one liver sample from Montezuma Creek and one liver sample from Verdure Creek.
  - Kidneys will be pooled to form one kidney sample from Montezuma Creek and one kidney sample from Verdure Creek.
  - The remaining carcasses will be grouped by sampling area to form three carcass samples from Montezuma Creek and up to three carcass samples from Verdure Creek.

- All samples will be analyzed for the metals listed in the Revised Draft Operable Unit III RI/FS Work Plan, Field Sampling Plan, and Quality Assurance Project Plan.

- All samples will be analyzed for gross alpha, beta, and gamma radiation rather than for the specific radioisotopes listed in the Revised Draft Operable Unit III RI/FS Work Plan, Field Sampling Plan, and Quality Assurance Project Plan.

EFFECTIVE DATE: May 1, 1995 EXPIRATION DATE: None

Review and Concurrence:

William Merrill/OU III Team Leader (Rust)	5/23/95 Date
Deb Richardson/Program Oversight Ldr. (Rust)	5/24/95 Date
Wanda Busby/Program Manager (Rust)	5/31/95 Date
Vernon Cromwell/Project Manager (DOE)	23 Jun 95 Date

DISTRIBUTION:

File Index # MSGW 1.14
Revised Draft Operable Unit III RI/FS Work Plan, Field Sampling Plan, and Quality Assurance Project Plan
K.A. Cary
D.T. Ealey
W.G. Merrill
F.A. Pearl
J.A. Ware

PROGRAM DIRECTIVE

Monticello Operable Unit III Directive — Directive No. MSGRAP 95-03

PROGRAM MANAGER: Wanda Busby

DATE: July 10, 1995

SUBJECT: Changes in sampling and analytical procedures for biotic and abiotic sampling in support of the Operable Unit III ecological risk assessment.

JUSTIFICATION FOR PROGRAM DIRECTIVE AND ASSOCIATED TASK CHANGES: A reevaluation of the strategy proposed for the OU III ecological risk assessment has indicated that risks to the environment will be more efficiently assessed by revising the approach presented in the revised draft OU III Remedial Investigation/Feasibility Study (RI/FS) Work Plan (March 1995). These changes will maximize use of existing data, limit the amount of required additional data, and ensure that risks to assessment endpoints can be adequately assessed.

ORGANIZATIONS AFFECTED: Environmental Services; Field Services; Health, Safety, and Security; Laboratory Services.

PLANS, MANUALS, AND PROCEDURES AFFECTED: Revised Draft Operable Unit III RI/FS Work Plan, Field Sampling Plan, and Quality Assurance Project Plan (March 1995).

DIRECTIVE:
The following stages of the ecological risk assessment are affected by this directive:

Step 4: Problem Formulation - Measurement Endpoint Selection

The changes to measurement endpoint selection are presented in Table 1 (strike-out text represents deletions in the scope of work; redlined text represents additions) and are summarized below:

- Eliminate bovine, deer, ground squirrel, and beaver/muskrat samples.
- Eliminate willow samples and add shrubs and forbs.
- Revise analyte list for biota samples to preliminary metals chemicals of potential concern (COPCs) and gross alpha, beta, and gamma.
- Eliminate use of population surveys to assess foraging behavior, diversity, density, and nesting activities.
- Perform population surveys only to assess occurrence of receptors of potential concern (ROPCs) for which insufficient data exist to determine presence or absence (i.e. southwestern willow flycatcher, spotted bat, peregrine falcon, and fish in Montezuma Creek).
- Eliminate histopathological analysis on muskrat liver and kidney samples.

- Add benthic macroinvertebrate samples for preliminary metals COPCs and gross alpha, beta, and gamma analyses

Step 4: Problem Formulation - Study Design

Sample sites along upper and lower Montezuma Creek have been relocated; revised sample locations are shown in Figures 1 through 8. As shown, nine sample sites are located along upper and lower Montezuma Creek. In addition, three sample sites are located within the reference area at Verdure Creek. Each sample site corresponds with a transect extending perpendicular to the creek. A survey stake will be placed at each end of each transect prior to sampling. The location of each survey stake along Montezuma Creek will be documented by conventional land surveying methods following sample collection. Land surveying will be accomplished in accordance with the procedures presented in the March 1995 revised draft OU III RI/FS Field Sampling Plan. The location of each survey stake along Verdure Creek will be approximated on the appropriate U.S. Geological Survey quadrangle map. Scaled coordinates with respect to the nearest section corner will measured from the map for each Verdure Creek transect.

Samples of grasses, shrubs, forbs, terrestrial invertebrates, benthic macroinvertebrates, soil, sediment, and surface water will be collected along the nine Montezuma Creek transects and three reference area transects. Additional sediment and benthic macroinvertebrate samples will be collected within two large ponds on Montezuma Creek. The first pond is the large stock pond shown in Figure 1. The second pond is the beaver pond located adjacent to the cliff swallow sampling area (Figure 4). Samples of cliff swallows will be collected at one Montezuma Creek location and one reference area location. Ground water samples from seeps in Montezuma Canyon will be collected if seeps that could provide drinking water for wildlife are found. Population surveys for ROPCs will be conducted throughout the Montezuma Creek study area.

Biotic Samples

Grass, shrub, and forb samples will be collected in a 3-foot band along each transect. Different species within each vegetation type will be collected in the approximate ratios in which they occur along each transect. Grasses and forbs will be clipped at ground level. Shrubs will be clipped at the base of the current year's growth (i.e., new shoots).

Benthic macroinvertebrate samples will be collected in accordance with the procedures specified in the revised draft OU III RI/FS Field Sampling Plan (March 1995).

Terrestrial invertebrate samples will be collected as follows:

1. Earthworms will be collected by excavating and sieving soil in 10 plots measuring one-foot wide by one-foot long by 6 inches deep. Five plots will be located on each side of the creek along each transect. The plots will be placed adjacent to soil boring locations.

2. Ground-dwelling insects will be collected in pitfall traps. Five traps will be located on each side of the creek along each transects. The traps will be placed adjacent to soil boring locations.

3. Insects in vegetation will be collected with a sweep net. The sweep net will be passed through vegetation along the length of each transect.

Biotic Surveys

Biotic surveys will be performed as follows:

1. Surveys of fish in Montezuma Creek will be performed in accordance with the methods specified the revised draft OU III RI/FS Field Sampling Plan (March 1995).

2. Aquatic mammal (beaver/muskrat) surveys will be performed in accordance with the methods specified the revised draft OU III RI/FS Field Sampling Plan (March 1995).

3. Southwestern willow flycatcher and peregrine falcon surveys will be conducted by walking the length of the study area and pausing in the areas where the receptors are most likely to occur. The surveys will be conducted early in the morning on three consecutive days.

4. Bat detectors will be used for spotted bat surveys. The surveys will be conducted by walking the length of the study area, either in the canyon bottom or on the canyon rim. Surveys will be performed at dusk on three consecutive days.

Surface Water Samples

One surface water sample will be collected at each of the nine Montezuma Creek and three reference area transects. Surface water sample volumes and analytical procedures will be revised from those specified in Section 3.1.2 and Table 6-6 of the revised draft OU III RI/FS Field Sampling Plan (March 1995). The revisions will increase the efficiency of sample collection and sample management, and will eliminate potential problems associated with sample representativeness and analytical precision.

The March 1995 plan specifies that total analyte concentrations and dissolved analyte concentrations will be determined from separate volumes of sample collected at a given surface water site. Instead, only filtered fractions for major ions, ammonium, and nitrate will be collected at any location. Also, filtered fractions for gross alpha/gross beta, lead-210, polonium-210, radium-226, thorium-230, and uranium-234, -235, and -238 will not be collected. Only unfiltered fractions for these analytes will be collected.

Gross alpha/gross beta, lead-210, polonium-210, radium-226, thorium-230, and uranium-234, -235, and -238 sample fractions will be analyzed to determine the concentrations of dissolved

and total phases. Field acidified samples will be filtered in the laboratory. Analysis of the liquid filtrate will determine the dissolved phase concentration. Separate analysis of the acid-digested solid residue will then enable determination of the total analyte concentration by the method of sums. The revisions to the surface water sample collection and analysis procedures are summarized in Table 2 (updated version of Table 6-6 of the draft OU III RI/FS Field Sampling Plan, March 1995).

Soil and Sediment Samples

Soil samples will be collected along each of the nine Montezuma Creek and three reference area transects. The samples will be obtained by drilling ten boreholes along each transect; five boreholes will be drilled on each side of the creek. The five boreholes will be equally spaced between the survey stake marking the end of the transect and the edge of the creek. If the distance between a transect end and the creek is between 8 and 20 feet, four boreholes will be drilled. If the distance is less than 8 feet, three borehole will be dug. Two composite samples will be collected for laboratory analysis from each side of the creek. The first composite sample will be obtained from the upper 3 inches of soil at each borehole. The second composite sample will be obtained from the interval extending from 3 inches to 24 inches at each borehole.

At each borehole, a total-count gamma-ray logging system will be used to measure the gamma rays in the borehole. If readings elevated with respect to background are detected, drilling will continue until either elevated readings are not obtained or drilling refusal occurs. If auger refusal is encountered, the borehole will be advanced using a shovel and a delta-scanner will be used for logging. Samples will not be collected for laboratory analysis below a depth of 24 inches.

Sediment samples will be collected along Montezuma Creek by obtaining five near surface samples (approximately the upper 3 inches of sediment) across each of the nine Montezuma Creek and three reference area transects. The five samples collected across each transect will be composited to form one sample for laboratory analysis. Procedures are currently being developed for collection of sediment samples from the ponds. The resulting pond sediment sampling procedures will be documented in a subsequent program directive.

The sample containers, holding times, and analytical parameters for sediment and soil samples presented in Table 6-1 of the revised draft OU III RI/FS Field Sampling Plan (March 1995) have been revised. The revised table is presented in Table 3. Table 4 contains sample container, holding time, and analytical parameter information for rinsate samples collected during soil and sediment sampling.

Step 7: Risk Characterization

The data collected in the site field investigation will be used to define a conservative exposure scenario for ecological risk in Montezuma Canyon. 95% upper confidence limit

(95%UCL) media concentration data and conservative exposure factors will be used to calculate hazard quotients and hazard indices for the receptors of concern.

Surveys for ROPCs for which insufficient data exist to determine presence or absence will be conducted to determine whether these organisms occur within OU III. Potential risk will be calculated for the mule deer, southwestern willow flycatcher, spotted bat, peregrine falcon, muskrat, and aquatic prey species, regardless of whether they are found during surveys. Potential risk to threatened fish in the San Juan river will be calculated assuming the receptors inhabit the river; no surveys will be conducted. Potential risk will be calculated for fish in Montezuma Creek only if they are found during surveys.

Tissue concentration data and histopathological data for cliff swallows will be used to assess risk to the spotted bat and the southwestern willow flycatcher. Tissue concentrations will be compared to toxicity benchmark values to obtain hazard quotients and hazard indices. Histopathological results from samples collected in OU III will be compared to results from samples collected in the reference area to determine whether OU III cliff swallows have significantly higher rates of abnormalities.

Risk to aquatic prey species will be assessed using benthic macroinvertebrate tissue concentrations and sediment and surface water concentrations. Contaminant concentrations in benthic macroinvertebrates collected in OU III will be compared to toxicity benchmark values and to concentrations in benthic macroinvertebrates from the reference area to estimate risk. Sediment and surface water concentrations will be compared to state or federal criteria for aquatic organisms to obtain hazard quotients and hazard indices for benthic macroinvertebrates.

Risk to fish in Montezuma Creek will be assessed by comparing sediment and surface water concentrations in Montezuma Creek to state or federal criteria for aquatic organisms to obtain hazard quotients and hazard indices. Risk to threatened fish in the San Juan River will be assessed by estimating dilution factors for Montezuma Creek surface water and sediment entering the San Juan River, and comparing diluted concentrations to state or federal criteria for aquatic organisms to obtain hazard quotients and hazard indices.

Risk to the remaining ROPCs will be assessed by comparing calculated doses to toxicity benchmark values. Abiotic and biotic media concentrations will be used in dose calculations for the mule deer, muskrat, peregrine falcon, and deer mouse. EPA's *Wildlife Exposure Factors Handbook* (EPA 1993) provides methods and exposure factors for dose calculations. Exposure parameters for each ROPC are presented in Table 5.

Calculated doses (for peregrine falcon, muskrat, mule deer, and deer mice) and measured concentrations (cliff swallows for southwest willow flycatcher and spotted bat, and benthic macroinvertebrates for aquatic prey species) will be compared to the No Observed Adverse Effects Level (NOAEL) and the Lowest Observed Adverse Effects Level (LOAEL) for each COPC to obtain hazard quotients. The NOAEL and LOAEL will be obtained for each

contaminant by multiplying toxicity benchmark values by uncertainty factors. Uncertainty factors will be applied if (1) the toxicity benchmark value is not a chronic NOAEL, (2) if the toxicity benchmark value is for a species other than the receptor of concern, (3) if the exposure pathway is different from the pathway under consideration. If a chronic NOAEL is found in the scientific literature, the LOAEL will be obtained by dividing the NOAEL by an uncertainty factor.

Hazard indices (sums of hazard quotients for groups of contaminant with similar toxicity mechanisms) will be calculated to estimate risk from receptors' exposure to multiple contaminants.

Toxicity benchmark values are expected to be available for most contaminants. For contaminants for which toxicity benchmark values are not available, biotic and abiotic media concentrations from OU III will be compared to concentrations from the reference area.

Quality Assurance (QA) and Quality Control (QC) Requirements

Where appropriate, the QA/QC requirements established in the OU III revised draft (March 1995) Quality Assurance Project Plan (QAPjP) apply to the sampling and survey tasks identified in this program directive. Standard Operating Procedures will be employed where applicable.

Table A-6 of the revised draft OU III RI/FS QAPjP is no longer valid based on the media, sample locations, number of samples, and analytical parameters revised by this program direcitve. The types and frequency of QC samples that will be collected for the media identified in this program directive are field duplicate samples and equipment blanks as follows:

Field Duplicates - Field duplicate samples will be collected at a frequency of 1 per 10 or fewer environmental samples. Additional volume of soil, sediment, and each terrestrial biota media will be collected and split (in the field) for a field duplicate. Duplicate samples of surface water will be collected in accordance with standard procedures. Field duplicate samples will be submitted blind to the laboratory.

Equipment Blanks - Equipment blanks will be collected at a frequency of 1 per 20 or fewer abiotic environmental samples when using non-disposable sampling equipment.

The Program Manager has recently issued Program Directive (MONT 95-01) on the subject of Photographs and Video Materials. Personnel may use the procedure (1.06.02 Documentation Control - VCR Tapes and Photographic Material, in the Operations Department Construction Procedures Manual) as prescribed by the program directive or the

equivalent procedure presented in Section 1.6 of the QAPjP with the following clarification:

1. Polariod photos will not be taken.
2. The disposition of each frame must be accounted for.

Table 1. Proposed Changes to Preliminary Assessment and Measurement Endpoints for OU III
(Modified from the March 1995 revised draft RI/FS Work Plan)

Assessment Endpoint	Measurement Endpoints	Rationale for Proposed Changes
Protection of mule deer populations from deleterious effects associated with elevated concentrations of metals and radionuclides.	• Measure concentrations of preliminary COPCs in ~~willow~~ shrubs.	ETAG agreement
	• Measure concentrations of preliminary COPCs in perennial grasses.	ETAG agreement
	• Measure concentrations of preliminary COPCs in forbs.	ETAG agreement
	• ~~Measure concentrations of preliminary COPCs in bovine or deer liver, kidney, and muscle.~~	Risk will be assessed via dose calculations.
	• ~~Conduct population surveys to document foraging behavior, population status of mule deer.~~	Observations over several years would be required to adequately assess foraging behaviors/population status.
	• Measure concentrations of preliminary COPCs in surface water, soils, and ground water*.	Assessment of potential ground-water ingestion pathway. ETAG agreement
Protection of southwestern willow flycatcher and spotted bat populations from deleterious effects associated with elevated concentrations of metals and radionuclides.	• Measure concentrations of preliminary metals COPCs and gross alpha, beta, and gamma activities in cliff swallow nestlings (liver, kidney) as a surrogate for southwestern willow flycatcher and spotted bat.	Revised analyte list is consistent with EPA recommendations.
	• Conduct histopathology analysis on cliff swallow nestling (liver, kidney) to determine pathological changes.	–
	• Conduct population surveys to document southwestern willow flycatcher and spotted bat ~~avian species~~ occurrence~~, diversity, density, and other indications of population status~~.	Observations over several years would be required to adequately assess diversity, density, and other indications of population status.
	• ~~Measure concentrations of preliminary COPCs in surface water.~~	Risks assessed on basis of tissue samples and histopathological analyses.

Table 1. Proposed Changes to Preliminary Assessment and Measurement Endpoints for OU III (continued)
(Modified from the March 1995 revised draft RI/FS Work Plan)

Assessment Endpoint	Measurement Endpoints	Rationale for Proposed Changes
Protection of peregrine falcon populations from deleterious effects associated with elevated concentrations of metals and radionuclides.	• Measure concentrations of preliminary metals COPCs and gross alpha, beta, and gamma activities in cliff swallow nestlings (whole body) to represent dietary intake of peregrine falcons. • Conduct population surveys to document peregrine falcon occurrence ~~foraging, nesting activity of peregrine falcons~~. • Measure concentrations of preliminary COPCs in surface water, soils, and ground water*.	Revised analyte list is consistent with EPA recommendations. Observations over several years would be required to adequately assess foraging and nesting activity of peregrine falcons. ETAG agreement
~~Protection of golden eagle populations from deleterious effects associated with elevated concentrations of metals and radionuclides.~~	~~• Measure concentrations of preliminary COPCs in ground squirrels to represent dietary intake of golden eagles.~~ ~~• Conduct population surveys to document foraging, nesting activity of golden eagles.~~ ~~• Measure concentrations of preliminary COPCs in surface water, soils.~~	Golden eagles were eliminated as ROPCs because they have a large home range and would not be a good indicator of site conditions. Deer mice will be substituted as ROPC.
Protection of ~~beaver or~~ muskrat populations from deleterious effects associated with elevated concentrations of metals and radionuclides.	• ~~Measure concentrations of preliminary COPCs in beaver or muskrat liver and kidney.~~ • ~~Conduct histopathological analysis on beaver or muskrat liver and kidney to determine pathological changes.~~ • Conduct population surveys to document muskrat occurrence ~~foraging behavior, population status, species occurrence, diversity, and density.~~ • Measure concentrations of preliminary COPCs in surface water, sediment, and shrubs (including willows). • Conduct benthic macroinvertebrate population studies and measure concentrations of preliminary COPCs in benthic macroinvertebrate samples.	Risk will be assessed via dose calculations. Risk will be assessed via dose calculations. Observations over several years would be required to adequately assess foraging behavior, population status, diversity, and density. Assessment of ingestion of shrubs for dose calculations. Benthic macroinvertebrate studies provide an indication of the overall health of the aquatic environment. These studies will support the assessment of risk to muskrat populations.

Table 1. Proposed Changes to Preliminary Assessment and Measurement Endpoints for OU III (continued)
(Modified from the March 1995 revised draft RI/FS Work Plan)

Assessment Endpoint	Measurement Endpoints	Rationale for Proposed Changes
Protection of aquatic prey species populations from deleterious effects associated with elevated concentrations of metals and radionuclides.	• ~~Conduct population surveys for earthworms, benthic invertebrates, and small mammals.~~ • Measure concentrations of preliminary COPCs in surface water and sediment. • Measure concentrations of preliminary metals COPCs and gross alpha, beta, and gamma activities in benthic invertebrates.	Observations over several years would be required to adequately assess populations; if needed, benthic survey results will be obtained from ongoing Oak Ridge National Laboratory program. Analytical results will be used for dose calculations. Analytical results will be used to support dose calculations for prey species.
Protection of Montezuma Creek small, non-game fish populations and San Juan River endangered fish populations from deleterious effects associated with elevated concentrations of metals and radionuclides.	• Compare water and sediment concentrations from Montezuma Creek and the San Juan River to benchmark ecotoxicity data to determine whether concentrations are harmful to fish. • Conduct population surveys to assess occurrence of fish in Montezuma Creek ~~if water or sediment concentrations exceed benchmark ecotoxicity concentrations~~.	– Preliminary assessment indicates water concentrations in Montezuma Creek may be harmful to fish.

* Ingestion of ground water from seeps will be included as an exposure parameter if seeps of sufficient volume to allow wildlife to drink are found along Montezuma Creek.

Table 2. Sample Containers, Preservation, Holding Times, and Analytical Parameters for Surface Water Samples and Associated Rinsate Samples; ERA and HHRA Tasks
(Modified from the March 1995 revised draft RI/FS Work Plan)

Analytical Parameter[a]	Container Type/Size[b]	Preservation	Holding Time
Metals (Al, As, Co, Cu, Mn, Mo, Se, Sn, V, Zn)	HDPE[c]/500 mL Amber	HNO_3 to pH<2	6 Months
Metals (Al, As, Co, Cu, Mn, Mo, Se, Sn, V, Zn)	HDPE/500 mL Amber	Filter by 0.45-μm filter, HNO_3 to pH<2	6 Months
Major Cations (Ca, Mg, K, and Na) (from same bottles as metals); totals and dissolved	HDPE		
Major Anions (Cl, F, SO_4)	HDPE/125 mL	Filter by 0.45-μm filter; Cool to 4°C	28 Days
Ammonium	HDPE/125 mL	Filter by 0.45-μm filter; Cool to 4°C; H_2SO_4 to pH<2	28 Days
Nitrate (NO_3 + NO_2 as N)	HDPE/125 mL	Filter by 0.45-μm filter; Cool to 4°C; H_2SO_4 to pH<2	28 Days
Gross Alpha/Gross Beta[e]	HDPE/1 L	HNO_3 to pH<2	6 Months[d]
Lead-210[e]	HDPE/1 L	HNO_3 to pH<2	6 Months[d]
Polonium-210[e]	HDPE/1 L	HNO_3 to pH<2	6 Months[d]
ium-226[e]	HDPE/3 @ 1 L	HNO_3 to pH<2	6 Months[d]
nadon-222	Glass w/Teflon; Septa/ 3 @ 40 mL	Cool to 4°C	Not Estab.
Th-230 (from same bottles as U-234/235/238)[e]	HDPE		
U-234, U-235, and U-238[e]	HDPE/1 L	HNO_3 to pH<2	6 Months[d]

[a] Equipment blanks not analyzed for major anions, major cations, ammonium, and nitrate fractions.
[b] Sample volumes may vary according to laboratory requirements.
[c] HDPE = high-density polyethylene
[d] Rust specifies a 6-month holding time for radionuclide water sample analyses in the absence of EPA-specified holding times.
[e] Laboratory filtration; analysis of liquid filtrate for dissolved phase; separate analysis of acid digested solid residue; total analyte concentration by method of sums. Separate analysis of acid digested solid residue not required for equipment blank samples for radionuclides.

Table 3. Sample Containers, Preservation, Holding Times,and Analytical Parameters for Sediment and Soil Samples, ERA and HHRA Tasks
(Modified from the March 1995 revised draft RI/FS Work Plan)

Sample Media: Sediment and Soil			
Analytical Parameter	**Container Type/Size[a]**	**Preservation**	**Holding Time**
Metals (Al, As, Co, Cu, Mn, Mo, Na, Se, Sn, V, Zn) Lead-210 (from same bottle as metals) Polonium-210 (from same bottle as metals) Potassium-40 (from same bottle as metals) Radium-226 from same bottle as metals) Th-230 and Th-232 (from same bottle as metals) U-234, U-235, and U-238 (from same bottle as metals)	HDPE[b]/500 mL Wide-mouth, opaque	None	6 Months[c]
Nitrate (NO_3+ NO_2 as N) Sulfate (same bottle as nitrate-nitrite)	HDPE or glass/125 mL	Cool to 4°C	28 days
Total Organic Carbon	HDPE or glass/125 mL	Cool to 4°C	28 days
pH (same bottle as nitrate-nitrite)			14 days
Moisture Content[d] (from same bottle as metals)			
Acid-Volatile Sulfide	HDPE or glass/125 mL	Cool to 4°C	14 days

[a]Sample volumes may vary according to laboratory requirements.
[b]HDPE = high-density polyethylene.
[c]Rust applies a 6-month holding time for radionuclide analyses for soil samples in the absence of EPA-specified holding times.
[d]Soil samples only.
[e]2L sample volume required for sediment comprised of >50 percent gravel.
[f]TBD = To be determined.

Table 4. Sample Containers, Preservation, Holding Times, and Analytical Parameters for Rinsate Samples Collected with Soil/Sediment Sampling Equipment

Analytical Parameter	Container Type/Size[a]	Preservation	Holding Time
Metals (Al, As, Co, Cu, Mn, Mo, Na, Se, Sn, V, Zn)	HDPE[b]/500mL Amber Bottle	HNO_3 to pH <2	6 Months
Lead-210	HDPE/1 L	HNO_3 to pH <2	6 Months[c]
Polonium-210	HDPE/1 L	HNO_3 to pH <2	6 Months[c]
Potasium-40	HDPE/1L	HNO_3 to pH <2	6 Months[c]
Radium-226	HDPE/ 3 @ 1 L		6 Months[c]
Th-230 and Th-232 (from same bottle as U-234/235/238)	HDPE		
U-234, U-235, and U-238	HDPE/1 L	HNO_3 to pH <2	6 Months[c]

[a]Sample volumes may vary according to laboratory requirements.
[b]HDPE = high-density polyethylene
[c]Rust applies a six-month holding time for radionuclide water sample analyses in the absence of EPA-specified holding times.

Table 5. Exposure Parameters for Ecological Risk Assessment Dose Calculations

Receptor	Exposure Pathways	Measured Concentrations	Calculated Concentrations	Other Parameters
Mule Deer	Ingestion of grasses, forbs, shrubs, soil, surface water, and ground water*	grasses, forbs, shrubs, soil, surface water, and ground water*	none	food ingestion rate, water ingestion rate, soil ingestion rate, body mass, area-use factor, exposure duration
Muskrat	Ingestion of forbs, shrubs, sediment, and surface water	forbs, shrubs, sediment	none	food ingestion rate, water ingestion rate, sediment ingestion rate, body mass, area-use factor, exposure duration
Peregrine Falcon	Ingestion of cliff swallows, soil, surface water, and ground water*	cliff swallows, soil, surface water, and ground water*	none	food ingestion rate, water ingestion rate, soil ingestion rate, body mass, area-use factor, exposure duration
Deer Mouse	Ingestion of grasses, forbs, terrestrial invertebrates, soil, surface water, and ground water*	grasses, forbs, terrestrial invertebrates, soil, surface water, ground water*	none	food ingestion rate, water ingestion rate, soil ingestion rate, body mass, area-use factor, exposure duration

* If seeps of sufficient volume to allow wildlife to drink are found in Montezuma Canyon, ingestion of groundwater from seeps will be included as an exposure parameter in uptake calculations.

EFFECTIVE DATE: July 17, 1995 EXPIRATION DATE: None

Program Directive initiated by: Kristen McClellen

Review and Concurrence:

William Merrill, OU III Team Leader (Rust) — Date 7/14/95

Deb Richardson, Program Oversight Leader (Rust) — Date 7/14/95

Wanda Busby, Program Manager (Rust) for WBB — Date 7/14/95

Vernon Cromwell, Project Manager (DOE-GJPO) — Date 14 Jul 95

DISTRIBUTION: (managed through Records Management)

T. Bartlett
W. Busby
K. Cary
E. Colunga
A. Craig
D. Ealey
H. Lucero
K. McClellen
B. Merrill
F. Pearl
D. Richardson
B. Smith
J. Ware

P. Gray (Program Directive File)
J. Butler (Project File MSGW 1.14)
V. Cromwell (DOE-GJPO) - 2 copies
P. Muschovic (US EPA) - 2 copies
T. Howard (UDEQ) - 2 copies
B. Bates (Utah State Division of Wildlife)
K. DuBois (US Fish and Wildlife Service)
G. Pierce (ORNL)

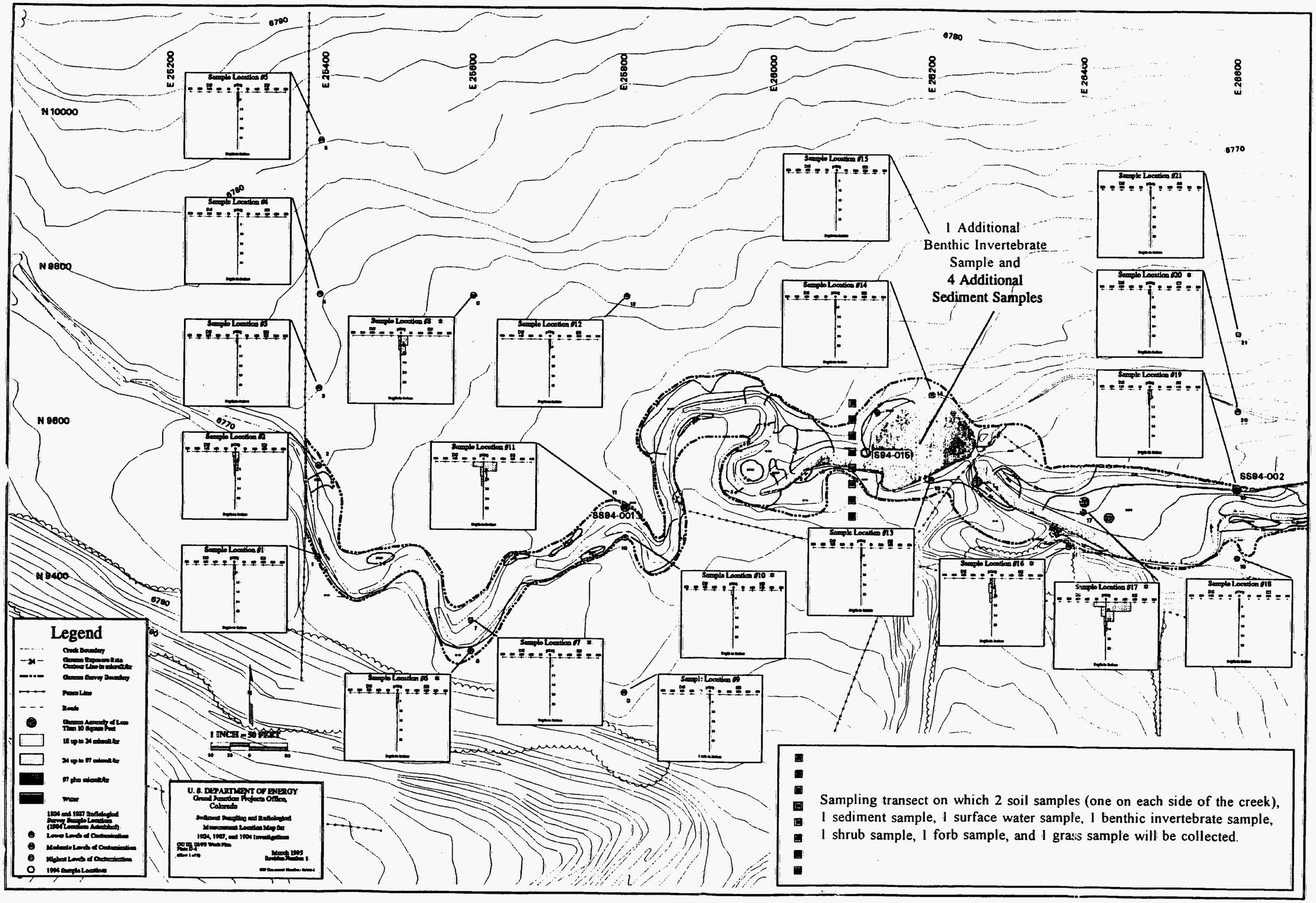


Figure 1. Proposed Sampling Locations for Operable Unit III.

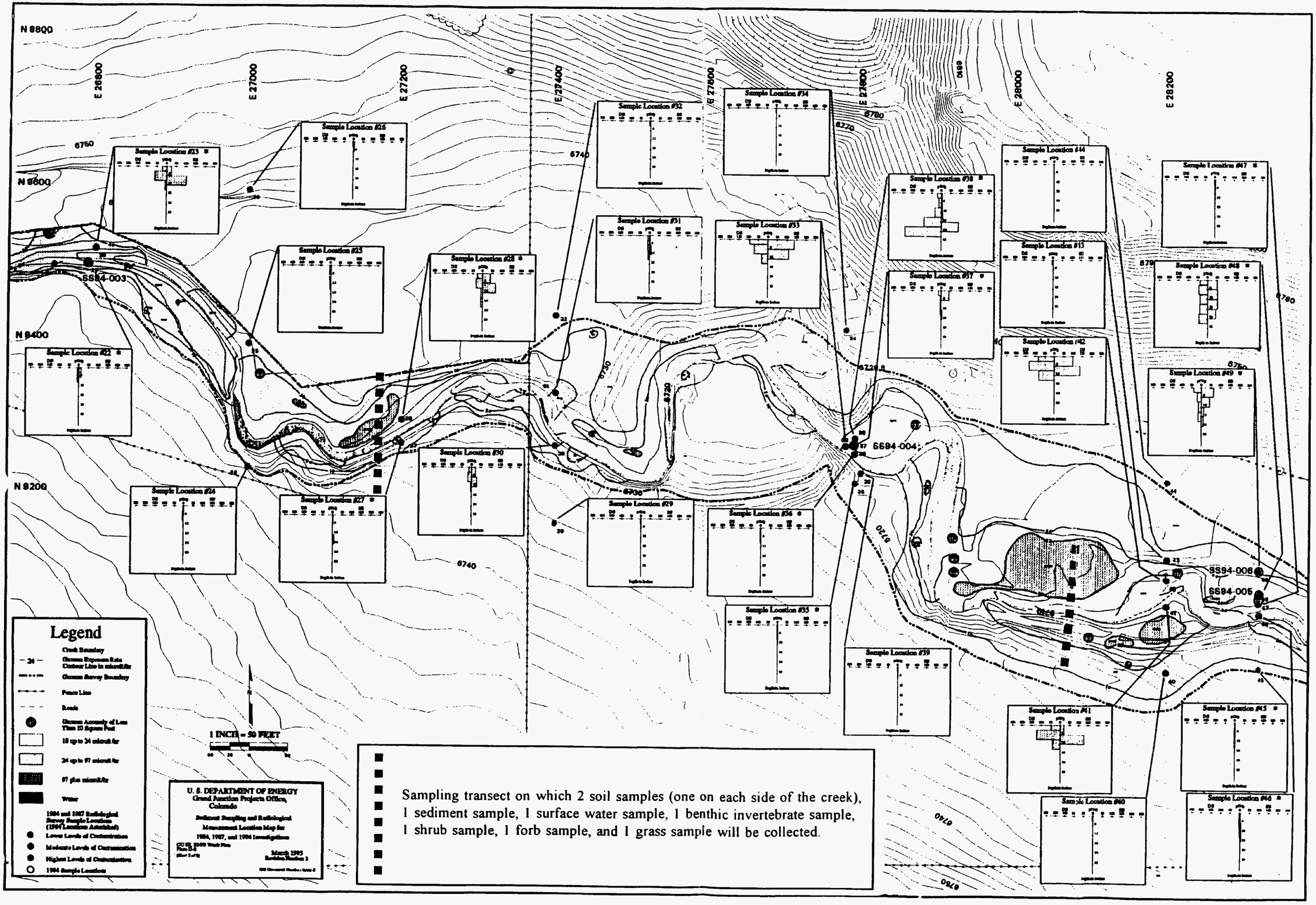


Figure 2. Proposed Sampling Locations for Operable Unit III (Continued)

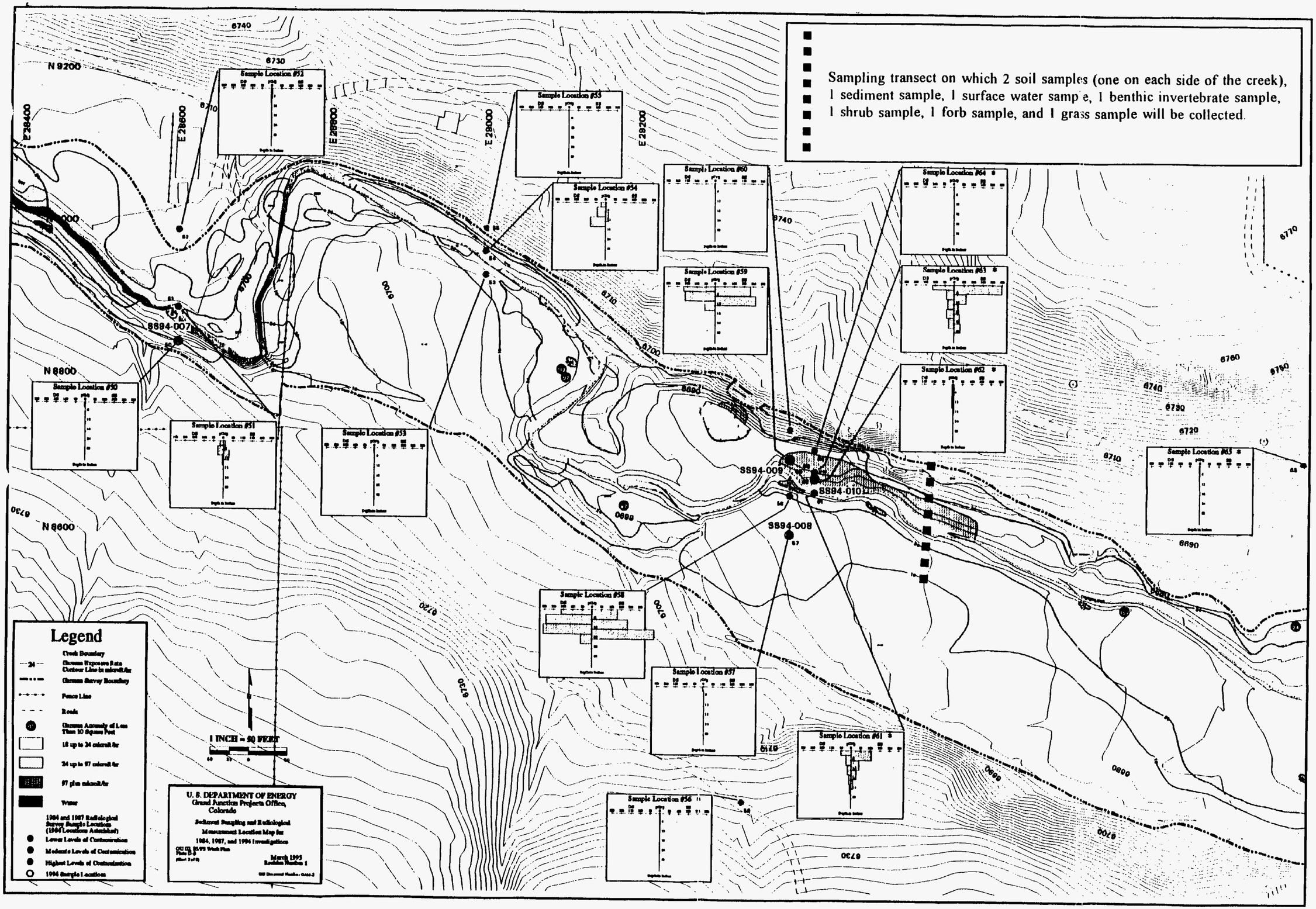


Figure 3. Proposed Sampling Locations for Operable Unit III (Continued)

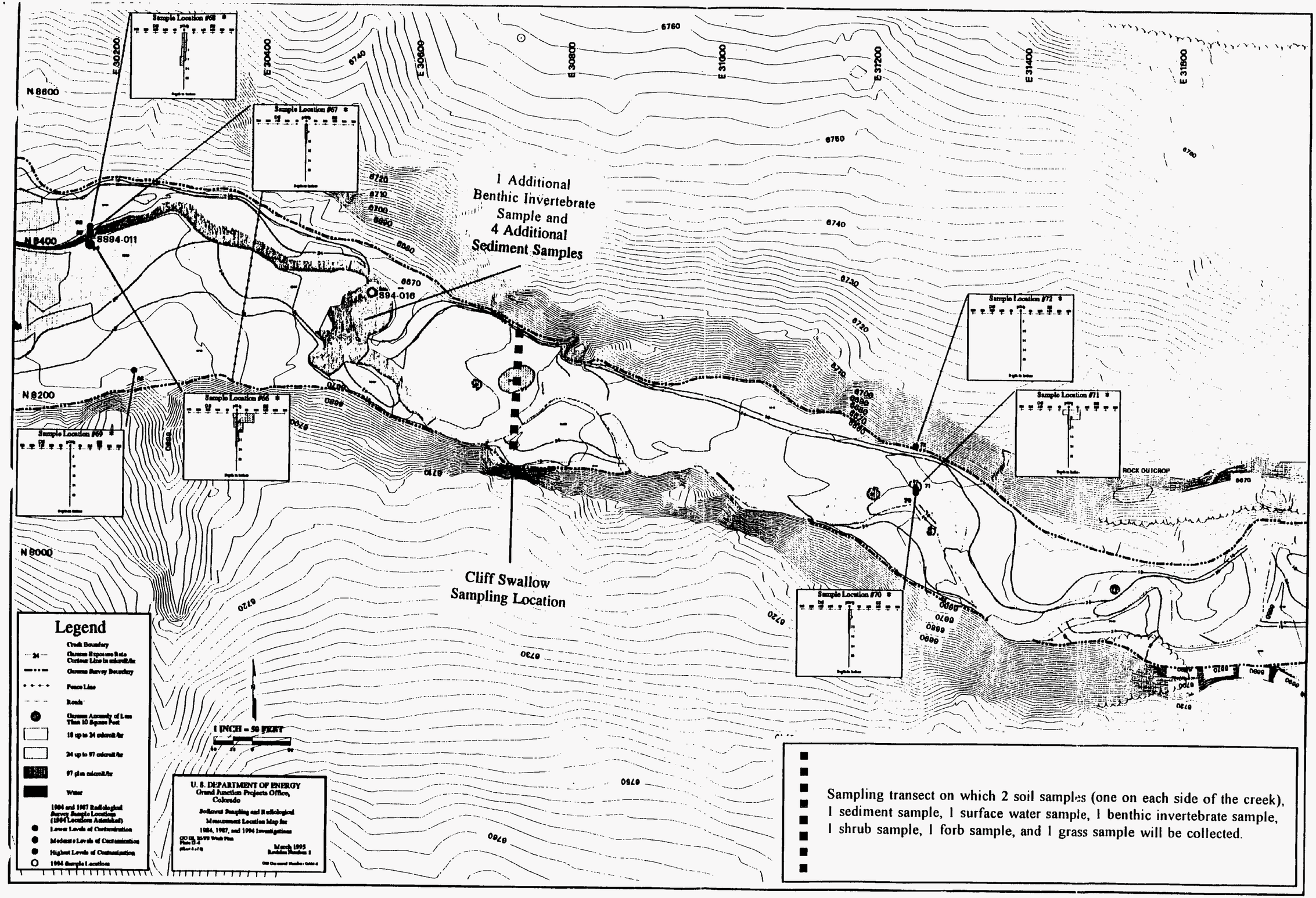


Figure 4. Proposed Sampling Locations for Operable Unit III (Continued)

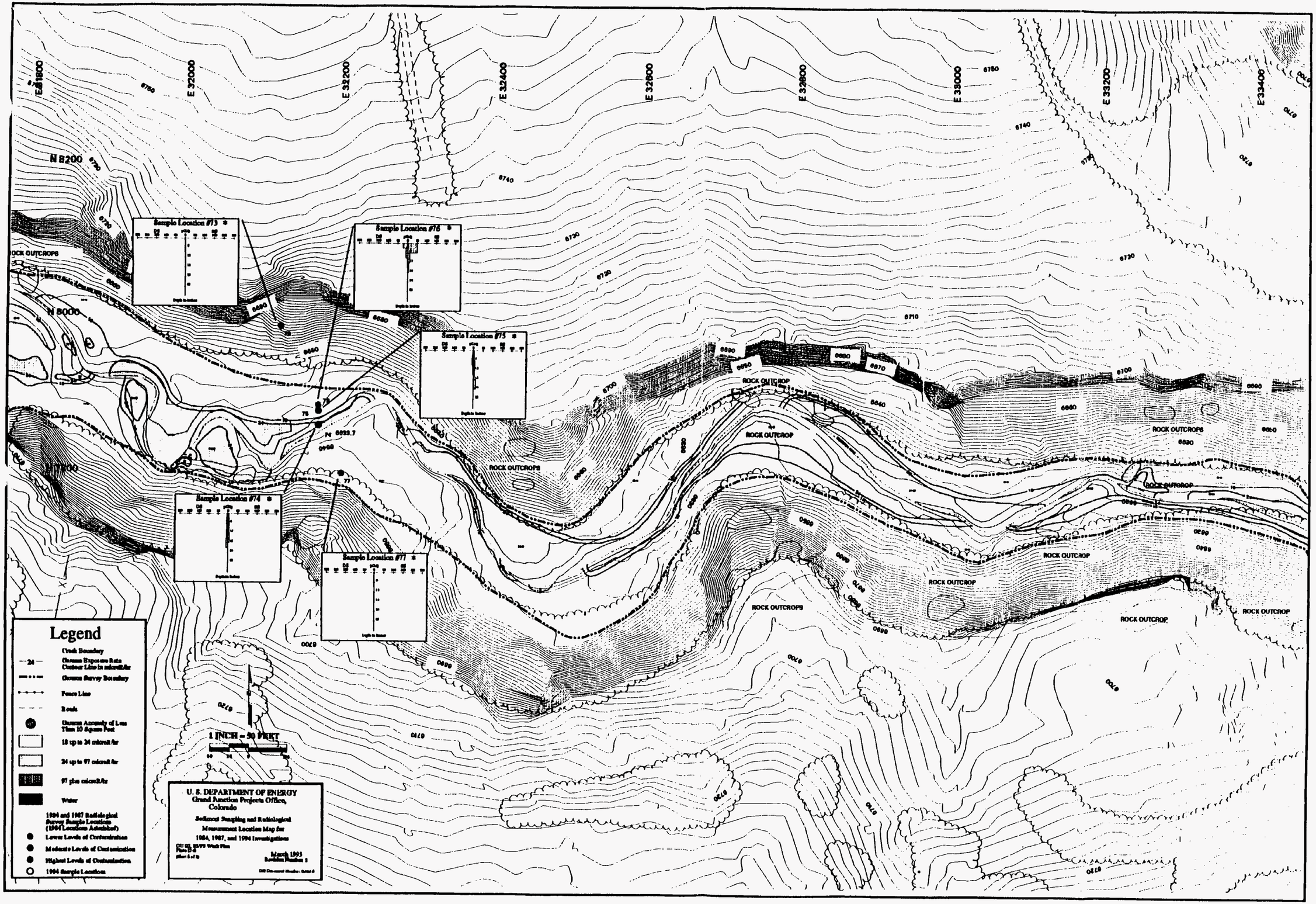


Figure 5. Proposed Sampling Locations for Operable Unit III (Continued)
(No sampling locations are shown on this figure.)

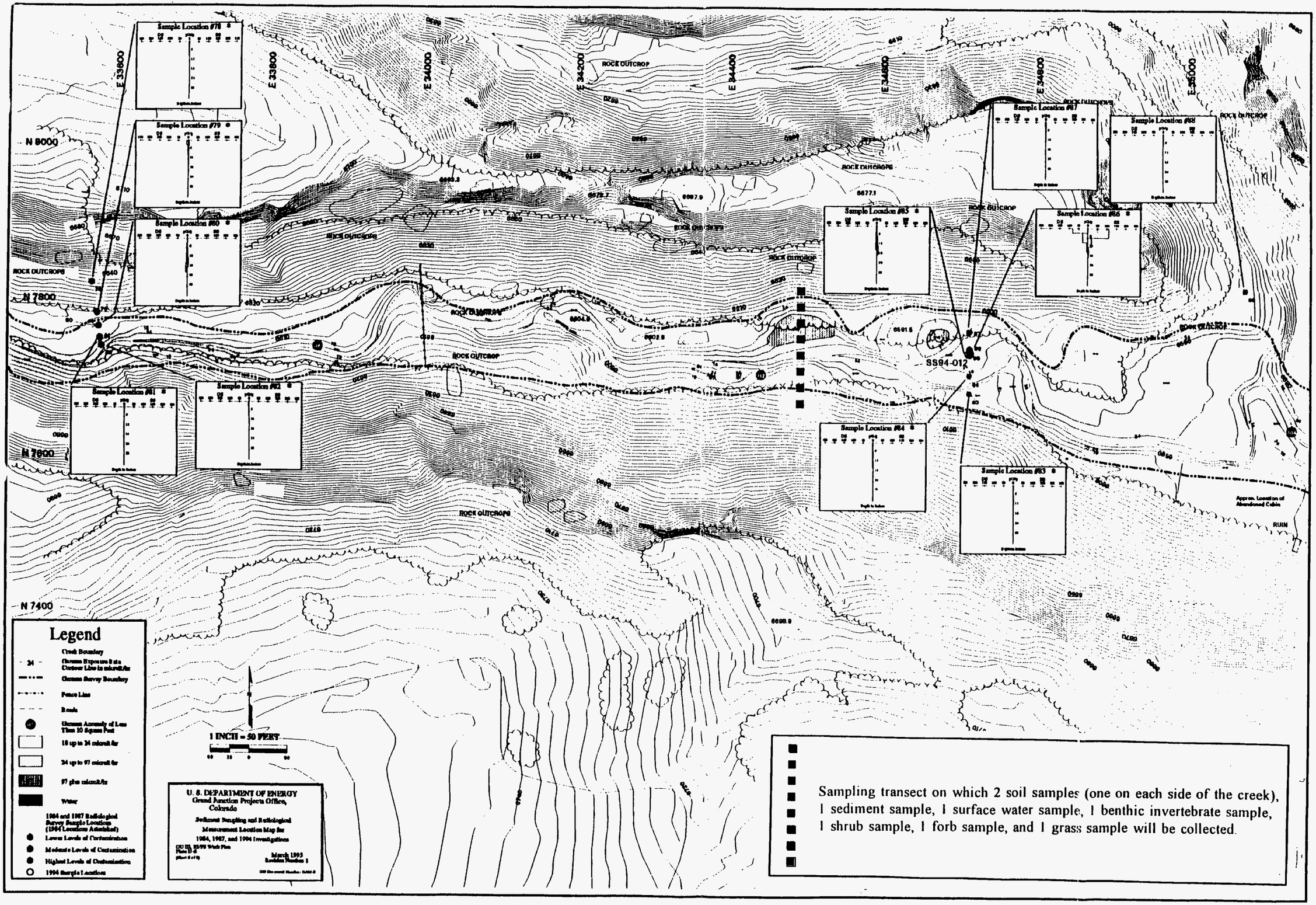


Figure 6. Proposed Sampling Locations for Operable Unit III (Continued)

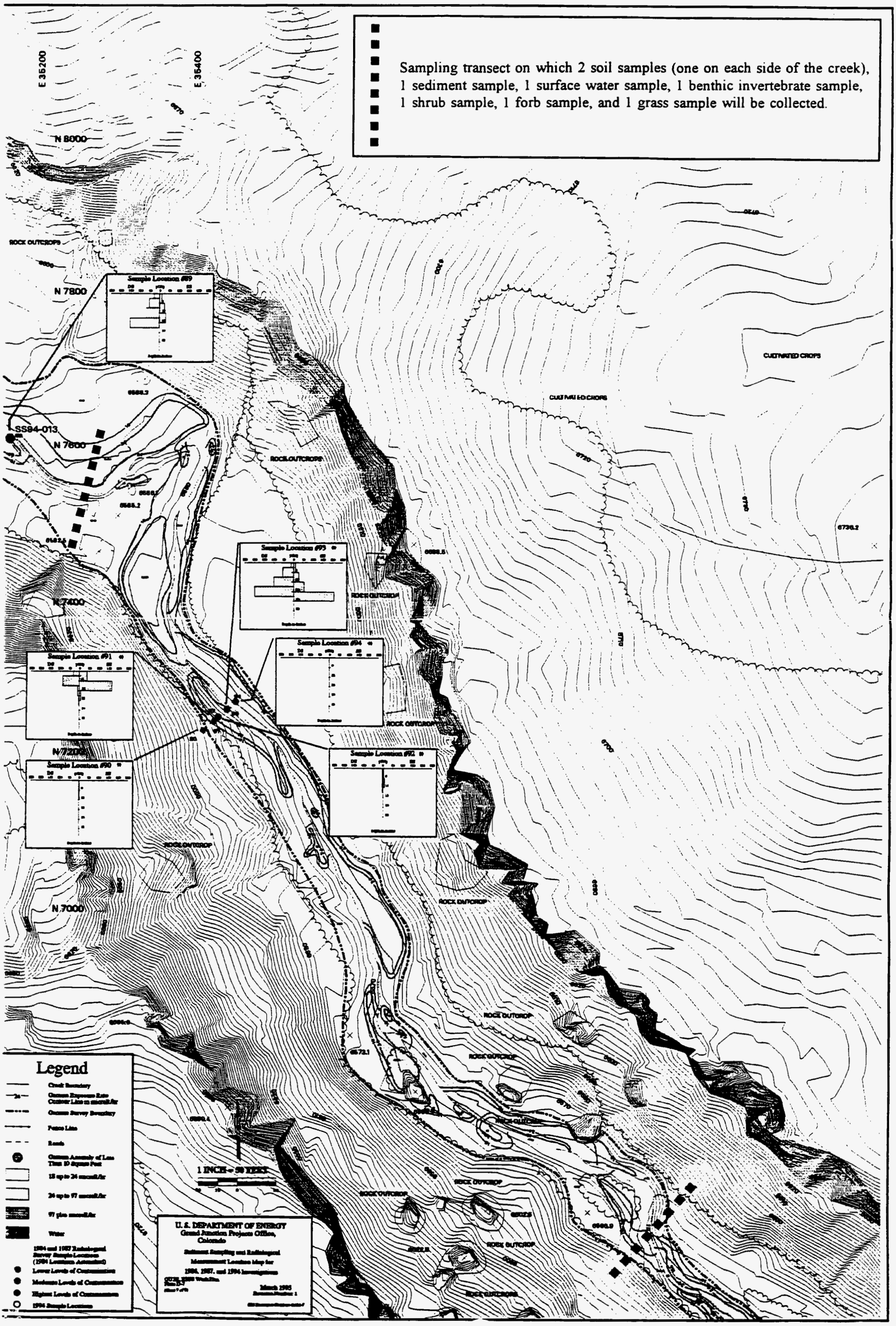


Figure 7. Proposed Sampling Locations for Operable Unit III (Continued)

Figure 8. Proposed Sampling Locations for Operable Unit III (Continued)

4-20 (2)

PROGRAM DIRECTIVE

Monticello Operable Unit III Directive — Directive No. MSGRAP 95-04

PROGRAM MANAGER: Wanda Busby

DATE: August 16, 1995

SUBJECT: Changes in the strategies and procedures for collection of sediment samples from ponds.

JUSTIFICATION FOR PROGRAM DIRECTIVE AND ASSOCIATED TASK CHANGES: A reevaluation of the strategy proposed for the OU III risk assessments has indicated that risks to human health and the environment will be more efficiently assessed by revising the approach presented in the revised draft OU III Remedial Investigation/Feasibility Study (RI/FS) Work Plan (March 1995). These changes will maximize use of existing data, limit the amount of required additional data, and ensure that risks to assessment endpoints can be adequately assessed. The revised approached developed for soil and sediment involves collection of the data necessary to assess whether pursuit of an "early action" is warranted.

ORGANIZATIONS AFFECTED: Environmental Services; Field Services; Health, Safety, and Security; Laboratory Services

PLANS, MANUALS, AND PROCEDURES AFFECTED: Revised Draft Operable Unit III RI/FS Work Plan, Field Sampling Plan, and Quality Assurance Project Plan (March 1995).

DIRECTIVE:
The nature and extent of contamination in sediment within two ponds on Montezuma Creek. will be assessed under the OU III RI. The upper pond is an irrigation impoundment in Upper Montezuma Canyon east of the millsite and the second pond is a beaver flooding located near the boundary between Upper and Lower Montezuma Creek (Figure 1 and Figure 4, respectively, Program Directive MSGRAP 95-03). The assessment will be performed by collecting sediment samples for laboratory analysis and obtaining a vertical profile of radioactivity through the sediment column. The field procedures to be used at each pond are described below.

A further revision is the addition of a sampling transect across Vega Creek immediately north of the intersection of Vega Creek and Highway 666, approximately 3 miles east of Monticello (Figure 1). Addition of this sampling transect revises the Ecological Risk Assessment study design and sampling locations described in Program Directive MSGRAP 95-03.

Pond Sediment Sampling and Gamma Logging
The two ponds were inspected on August 11, prior to the preparation of this directive. The water level in the irrigation pond was found to have receded considerably, due to the

seasonal decrease in flow in Montezuma Creek. The water remaining in the irrigation pond was estimated to be approximately 15 inches deep. The depth of water in the beaver pond was estimated to be approximately 12 inches near the shore and approximately 36 inches in the central portion of the pond. At each pond, sediment samples will be collected along the shoreline and within the ponds.

Three sampling sites will be randomly selected along the current shoreline of each pond. Two additional sites will be randomly selected at each pond within the perimeter of the ponds, below the current water level. A sampling platform(s) will be constructed of lumber to provide a solid, submerged base for sampling personnel to work on. Additional lumber or plywood may be used that will be submerged to provide solid footing for sampling personnel to access the sampling sites. The platform(s) will be used to collect samples at the 5 irrigation pond sites and along the 3 shoreline sites of the beaver pond. Samples will be collected within the beaver pond using an inflatable raft.

Sampling will be conducted as specified below.

1. A total-count gamma logging system will be used to obtain a vertical profile of radioactivity measurements at each of the 5 irrigation pond sites and the three shoreline sites at the beaver pond. The logging system will not be used at the two sites located within the perimeter of the beaver pond that will be sampled from the raft. The profile will be obtained by lowering a gamma detector through probe rods that have been manually driven to the maximum depth feasible. Measurements will be recorded at 6-inch increments from the sediment/water interface to the total depth. A HiLift jack (or equivalent) will be used to retreive the probe rods upon completion of logging.

2. A decontaminated grab-sampling device, shovel, or hand scoop will be used to collect a near-surface sediment sample at each of the 10 sites for chemical analysis of metals, radionuclides, nitrate, and total organic carbon. At the 4 sites within portions of the ponds below the current water level, a portion of each near-surface sample will immediately be placed in the appropriate sample container for acid-volatile sulfide analysis. The sample for acid-volatile sulfide analysis will be collected such that head space in the sample container is minimized. The remaining sediment collected in the grab sampler will then be used to fill sample containers for the remaining analytes. Sediment sample containers, preservation, and analytes are presented in Table 3 of Program Directive MSGRAP 95-03.

3. Subsurface samples will be collected to the maximum depth feasible at 2 of the shoreline sites at each pond and 1 of the sites within the perimeter of the irrigation pond. Subsurface samples will not be obtained within the perimeter of the beaver pond. Attempts will be made to obtain as deep a sample as possible using the Geoprobe Systems 2-foot large bore and 4-foot Macro-core sample barrels. One sample will be composited over each 2-foot interval recovered for chemical analysis

of metals, radionuclides, nitrate, and total organic carbon. If insufficient sample volume cannot be recovered in a 2-foot interval, 4-foot intervals may be composited. If the 2-foot sample barrel is found to be more efficient, two adjacent samples will be composited to form one sample for chemical analysis. It is anticipated that the maximum depth of sampling will be from 4 to 6 feet. A HiLift jack (or equivalent) will be used to retrieve the sample barrel.

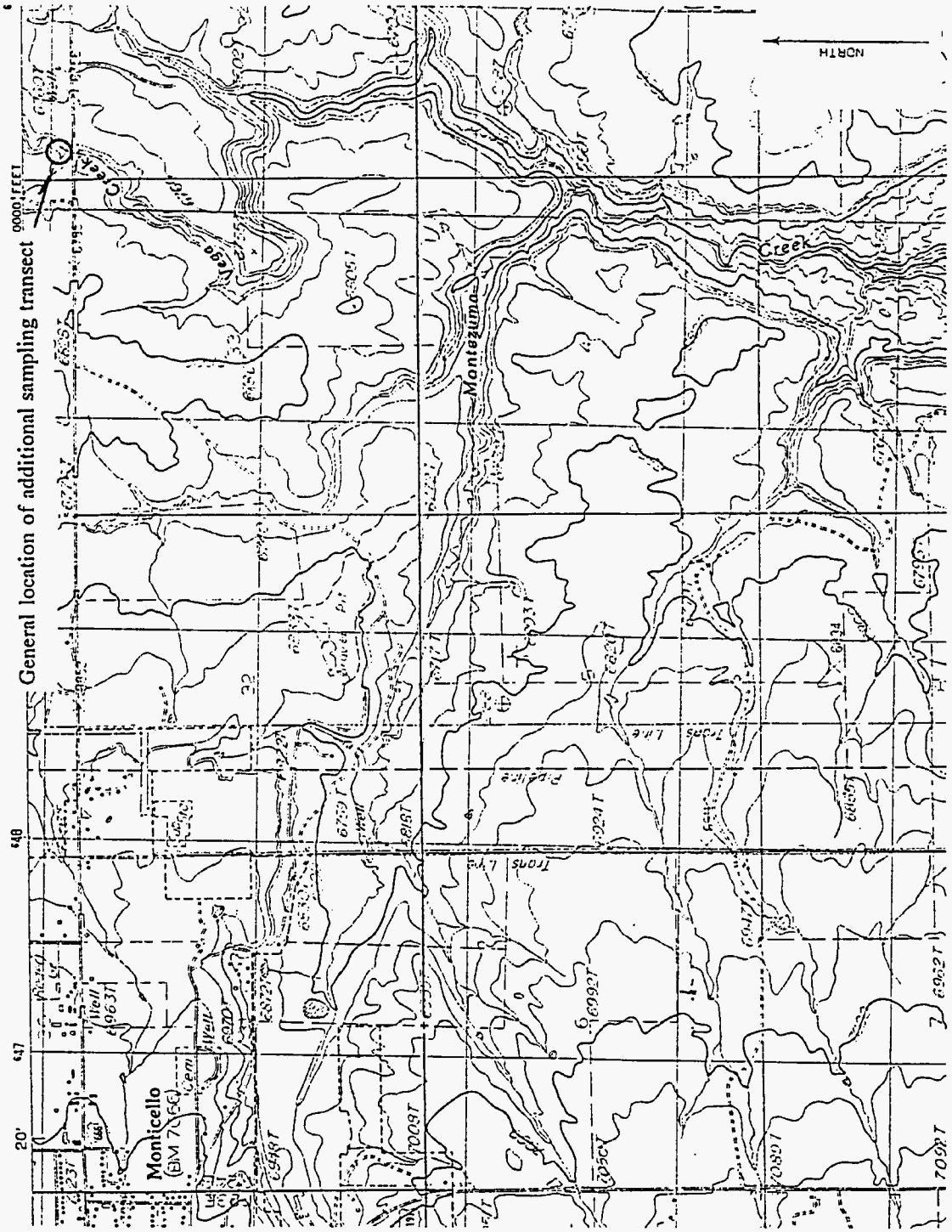
4. A sample will be collected for grain-size analysis at one site at each pond. The sample will be collected by manually driving the Macro-core sampler to a depth of 4 feet. The sample obtained over this 4-foot interval will be composited and placed in a 1-liter container.

5. Sampling platform materials will be appropriately disposed as investigation derived waste upon completion of sample collection.

Vega Creek Sampling Transect

As additional sampling transect will be established across Vega Creek a location north of the intersection of Vega Creek and Highway 666, approximately 3 miles east of Monticello (Figure 1). The transect will be used as a reference exposure area for the Ecological Risk Assessment. The transect will be established according to the procedures described in Program Directive MSGRAP 95-03. Samples of sediment, surface water, and benthic macroinvertebrates will be collected for laboratory analysis from this transect according to the procedures described and referenced in Program Directive MSGRAP 95-03.

Figure 1. Location of Additional Sampling Transect at Vega Creek



PROGRAM DIRECTIVE

Monticello Operable Unit III Directive — Directive No. MSGRAP 95-05

PROGRAM MANAGER: Wanda Busby

INITIATED BY: Tim Bartlett

EFFECTIVE DATE: October 23, 1995 — EXPIRATION DATE: Not Applicable

SUBJECT: Revisions to pond sediment sampling and gamma-logging tasks.

JUSTIFICATION FOR PROGRAM DIRECTIVE AND ASSOCIATED TASK CHANGES: Preliminary evaluation of pond sediment sampling and gamma-logging results (August 1995) indicates that revisions to the scope of work presented in the Draft Final OU III Remedial Investigation/Feasibility Study (RI/FS) Work Plan (September 1995) are appropriate. The purpose of the pond sediment sampling effort and gamma logging surveys is to assess whether mill tailings have accumulated within depositional features along upper and lower Montezuma Creek. Specifically, the studies are directed toward the identification of comparatively large repositories of mill tailings which could act as significant sources of contamination to surface water or groundwater or present an unacceptable risk to human health or the environment if released during irrigation or dam breach. The two major repositories (Adams irrigation pond and the upper beaver pond) were surveyed in August 1995. The results of those surveys indicate that neither pond represents a significant repository of mill tailings. The study proposed under this Directive will be performed to assess if significant quantities of mill tailings are present in low-velocity reaches along upper Montezuma Creek and in the small beaver ponds and low-velocity reaches along lower Montezuma Creek.

The changes detailed below will maximize use of existing data, limit the amount of sediment samples to be collected, and provide a cost-effective method to investigate the distribution of potentially contaminated sediments in Montezuma Canyon. The revisions will ensure that risk assessment endpoints can be adequately assessed and will also contribute in determining if an "early action" is warranted.

ORGANIZATIONS AFFECTED: Environmental Services; Operations Support Identification/Verification Group; Health, Safety, and Security; Analytical Chemistry Laboratory

PLANS, MANUALS, AND PROCEDURES AFFECTED: Draft Final Operable Unit III RI/FS Work Plan, Field Sampling Plan, and Quality Assurance Project Plan (September 1995).

DIRECTIVE:
Initial pond sediment sample collection and sediment profile gamma-logging were conducted August 21 - 23, 1995, under Directive No. 95-04 to the Revised Draft Final OU III RI/FS Work Plan, Field Sampling Plan, and Quality Assurance Project Plan (March 1995). This initial monitoring was conducted at Adams irrigation pond, the upper beaver pond, and the swallow sampling site beaver pond (Figures 1 through 3). The scope of work for pond sediment sampling specified in the directive was not entirely completed during the August 1995 event. The scope of work that was not completed involved collection of samples for acid-volatile sulfide analysis. In addition, samples could not be collected for analysis of chemicals of potential concern at depths greater than 2 feet because of sampling equipment limitations. The collection of samples for acid-volatile sulfide analysis and at depths greater than 2 feet is included in the scope of work for this directive.

The scope of work to be completed under this Directive includes 1) collection of samples for acid-volatile sulfide analysis, 2) gamma logging in ponds and low velocity reaches along upper and lower Montezuma Creek, 3) collection of samples for analysis of chemicals of potential concern, and 4) collection of samples for grain-size analysis. Work will be performed in accordance with the procedures, methodologies, and protocols specified in the Draft Final OU III RI/FS Work Plan, Field Sampling Plan, and Quality Assurance Project Plan (September 1995), as amended by this Directive.

Sample Collection for Acid-Volatile Sulfide Analysis

One sediment sample will be collected for acid-volatile sulfide analysis at the irrigation pond, the upper beaver pond, and each of the nine ecological risk assessment transects established along Montezuma Creek. The ponds and sampling transects are shown in Figures 4 through 11. Analytical results will be used to assess metals bioavailability within sediment. The samples at the two ponds will be collected coincident with the locations and depth intervals at which elevated gamma activities were noted during the August 1995 sampling event. At the irrigation pond, elevated gamma activities were noted within the 42 to 54-inch depth interval at sample location I.D. IP-04 (Figure 1 and Table 1). At the upper beaver pond, elevated gamma activities were reported within the 6 to 18-inch depth interval at sample location I.D. UBP-02 (Figure 2 and Table 1). At each sampling transect, one sample will be collected from the 0- to 12-inch depth interval. Samples for acid-volatile sulfide analysis will only be collected in areas inundated by water.

Samples will be obtained by hand-driving a core sampler through the target sampling interval. Samples will be collected in acetate liners such that head space is minimized. The liners will be cut to remove any headspace, if necessary, and capped immediately after the sample is retrieved. Excess water will be decanted to the surface of the core prior to capping the top. The caps will be secured with duct tape, and the liner will be labeled with indelible ink to indicate sample location identification and top and bottom of core. The core sample will be assigned three separate ticket book numbers, corresponding to top, middle and bottom horizons of the core. The core sample will be placed in a sealable polyethylene bag and maintained at $\leq 4°C$ until laboratory analysis. The sample will be handled to prevent wet-ice

melt water from cross-contaminating the sediment, and to prevent sample freezing and liner rupture if dry ice is used. The length of the core will be recorded in the field logbook.

The laboratory will analyze three horizons in each acid-volatile sulfide core sample, corresponding to the top, middle, and bottom of the core length. Each horizon in the core will consist of sufficient sediment required for preparation and analysis as per the analytical method. The laboratory may uncap either end of the core liner to access sample material from the top and bottom of the core. The liner will either be cut or the sample will be extruded from the liner to access the middle portion of the core.

Gamma Logging

Gamma logging will be performed in low-velocity reaches/ponded areas along upper and lower Montezuma Creek and in beaver ponds located downstream of the swallow sampling site beaver pond. Gamma logging provides real-time results which allow project personnel to quickly determine if further investigation in a given area is warranted. Gamma logging will be performed in areas selected as likely locations for the deposition of significant amounts of sediment. At least one logging site will be selected in each area; however, additional sites will be logged if warranted on the basis of initial log results. The areas in which gamma logging will be performed are described below.

- The sediment profile in three areas of ponded water between the irrigation pond and upper beaver pond will be gamma-logged. The ponded areas tentatively identified for gamma-logging are shown in Figures 4 through 7 as Areas 1 through 3. Other prominent areas of deposition will be considered based on field reconnaissance. Within each area, at least one site will be selected for total-count gamma-logging. Specific site considerations will include areas adjacent to regions of elevated surface gamma readings in soil and depositional areas which may be present (e.g., near the pond inlet, near the dam [if present], inside meanders, and other slack-water areas. Sites will be located within, or immediately adjacent to, areas inundated by water. Sampling areas and sites will be documented in the field logbook and photographed. The observations and criteria used to select sampling locations will also be documented in the field logbook.

- Gamma logging will be performed in three areas of ponded water between the swallow sampling site beaver pond and the abandoned cabin (Areas 4, 5, and 6 - Figure 7). Other prominent areas of deposition will be considered based on field reconnaissance. Within each area, at least one site will be selected for total-count gamma-logging. Individual sites will be selected in the field according to criteria outlined above. Sites will be located within, or immediately adjacent to, areas inundated by water. Sampling areas and sites will be documented in the field logbook and photographed. The observations and criteria used to select sampling locations will also be documented in the field logbook.

- The area inside the stream meander immediately northwest of the abandoned cabin will be gamma-logged (Figure 9). At least one site along the inside of the meander will be selected in the field.

- Two to four sites within approximately 0.5-mi. below the confluence of Montezuma and Vega Creeks (limit of 1994 surface-gamma survey, Figure 11) will be selected for gamma-logging. Surveys will occur at locations considered to contain the largest quantities of sediment (major depositional bars and/or eddy pools). Sites will be located within, or immediately adjacent to, areas inundated by water. Sampling areas and sites will be documented in the field logbook and photographed. The observations and criteria used to select sampling locations will also be documented in the field logbook.

Collection of Samples for Analysis of Chemicals of Potential Concern

Additional sediment samples will be collected for analysis of chemicals of potential concern. Sampling will be accomplished using a core sampler capable of obtaining sediment samples to a maximum depth of 5 feet. Each sample will be composited from a one-foot length of core. If sufficient volume for analysis cannot be obtained from a single one-foot lift, cores from successive one-foot lifts within the target interval will be composited to form the sample for analysis. Except for moisture content, grain-size distribution, and acid-volatile sulfide, the samples will be analyzed for the parameters listed in Table 4-1 of the Draft Final Field Sampling Plan (September 1995). Sample containers and preservation requirements are also specified in Table 4-1.

One sample will be collected at Adams irrigation pond. The sample will be obtained from the 42- to 54-inch depth interval near sample location I.D. IP-04 (Figure 1). Sampling results will be used to assess metals concentrations within the zone of high gamma activity reported during the August 1995 sampling event (Table 1). Additional samples will be collected at the locations and depth intervals corresponding to zones of elevated gamma activities encountered during the gamma logging effort discussed above.

Collection of Samples for Grain-Size Analysis

One sediment sample for grain-size analysis will be collected at the irrigation pond and the upper beaver pond. Each sample will be obtained by hand-driving a core sampler to a depth of 24 inches. The sediment obtained from the 0- to 24-inch depth interval will be composited and placed in a 1-liter container.

Grain-size analysis results will be used to support estimation of hydrologic parameters for sediment. The resulting hydrologic parameters will be used to support the groundwater modeling effort.

Review and Concurrence:

William Merrill/OU III Team Leader (Rust) — Date 10/11/95

Approval to Issue:

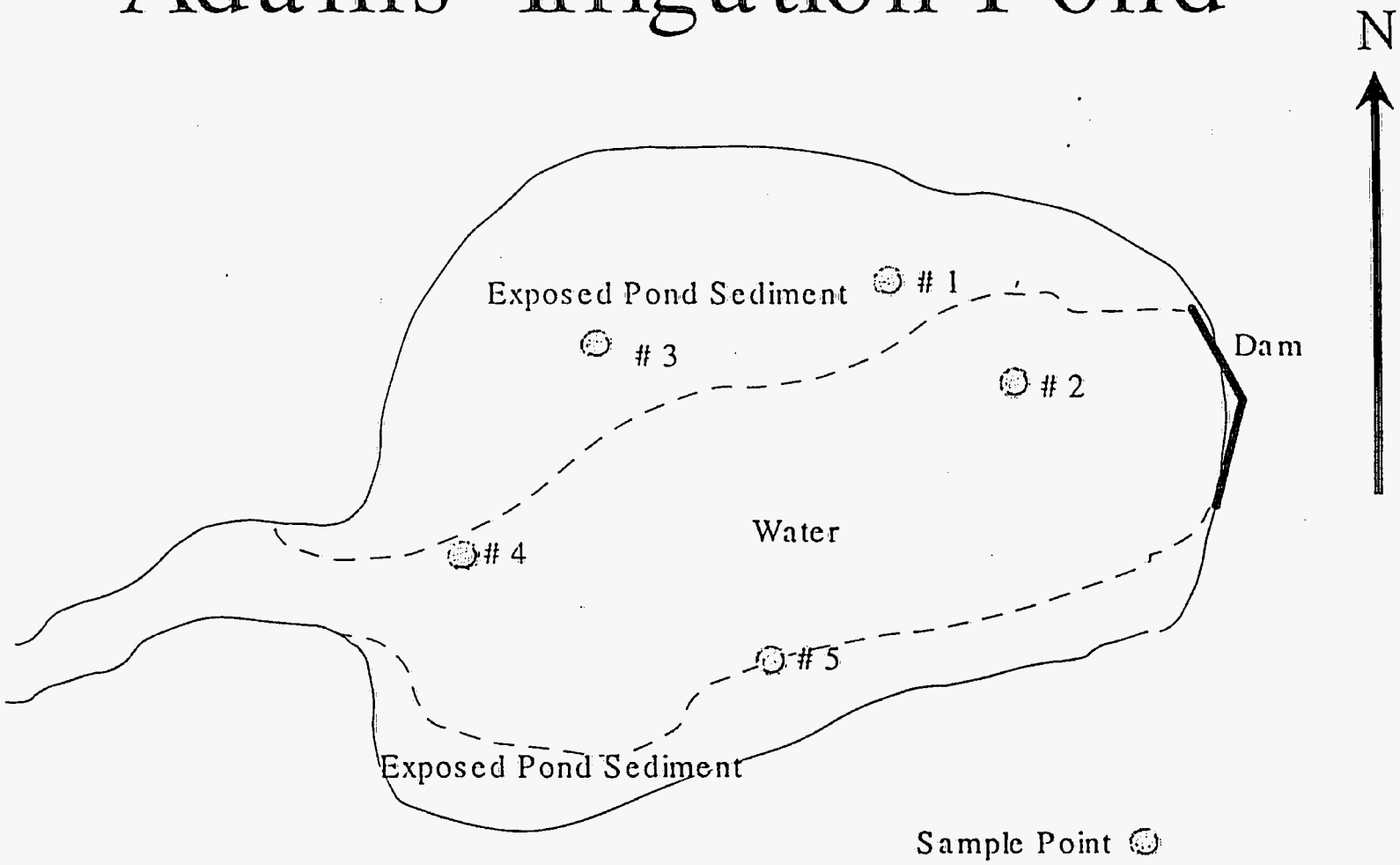
for Wanda Busby/Program Manager (Rust) — Date 10-11-95

Vernon A. Cromwell/Project Manager (DOE) — Date 11 Oct 95

DISTRIBUTION: (managed through Records Management)
Records Management File Index MSGW 1.14

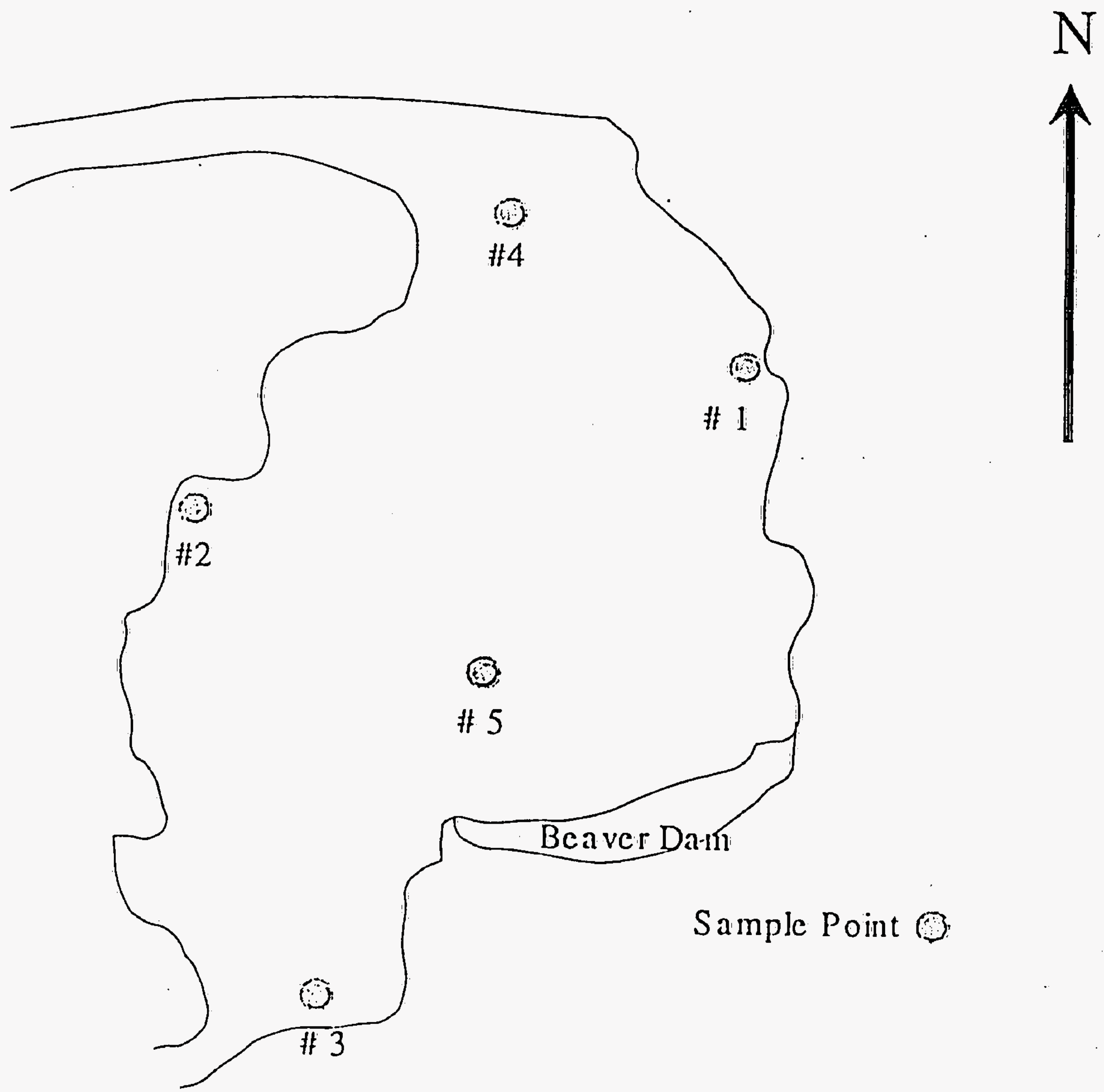
T. Bartlett
W.Busby
K.A. Cary
E. Colunga
A. Craig
D.T. Ealey
H. Lucero
W.G. Merrill
K. McClellen
F.A. Pearl
D. Richardson
B. Smith
J. Ware
P. Gray (Program Directive File)
V. Cromwell (DOE-GJPO) 2 copies
P. Muschovic (US EPA) 2 copies
D. Bird (UDEQ) 2 copies

Adams' Irrigation Pond



DIRECTIVE NO. MSGRAP 95-05 Figure 1

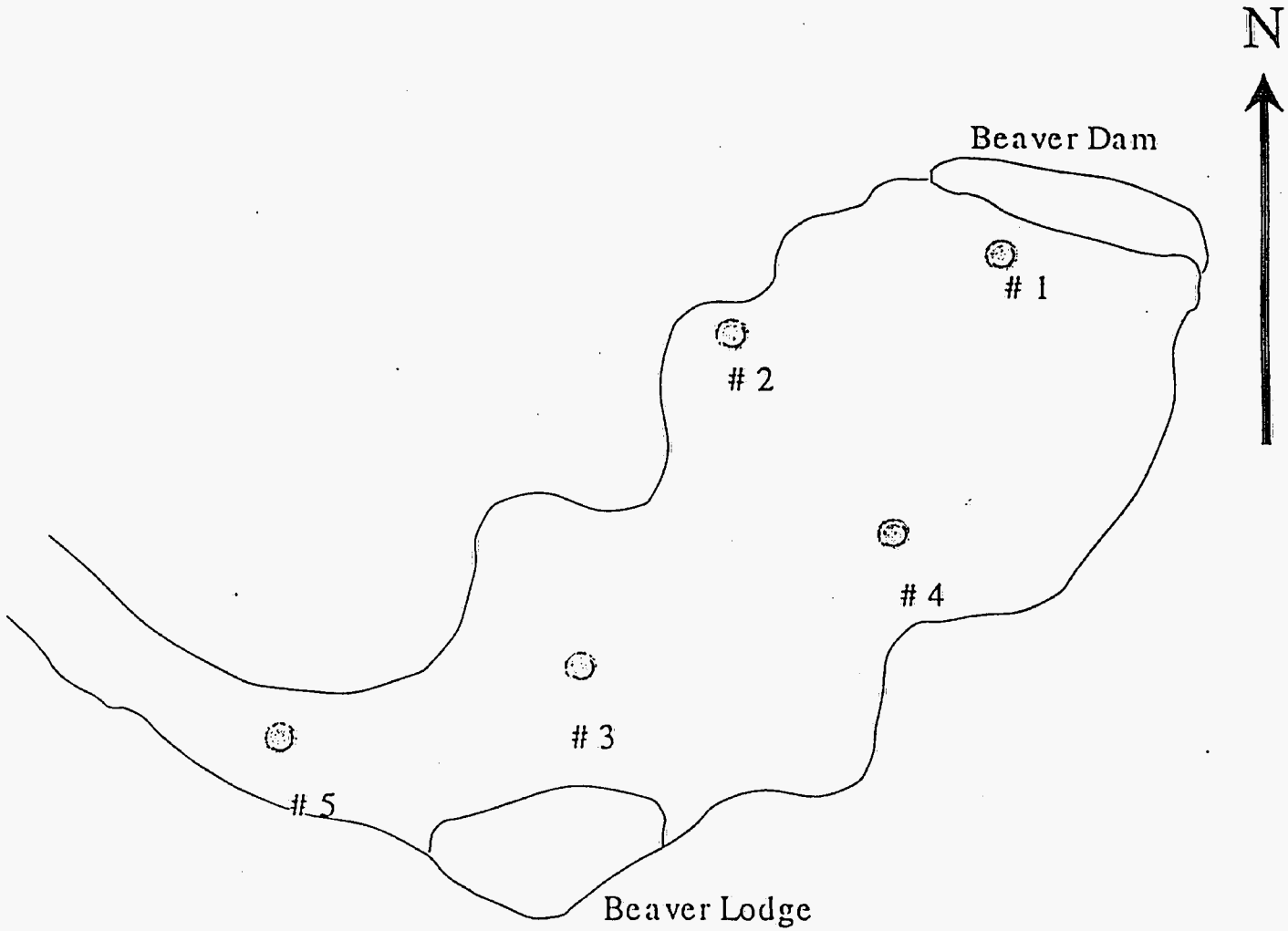
Upper Beaver Pond



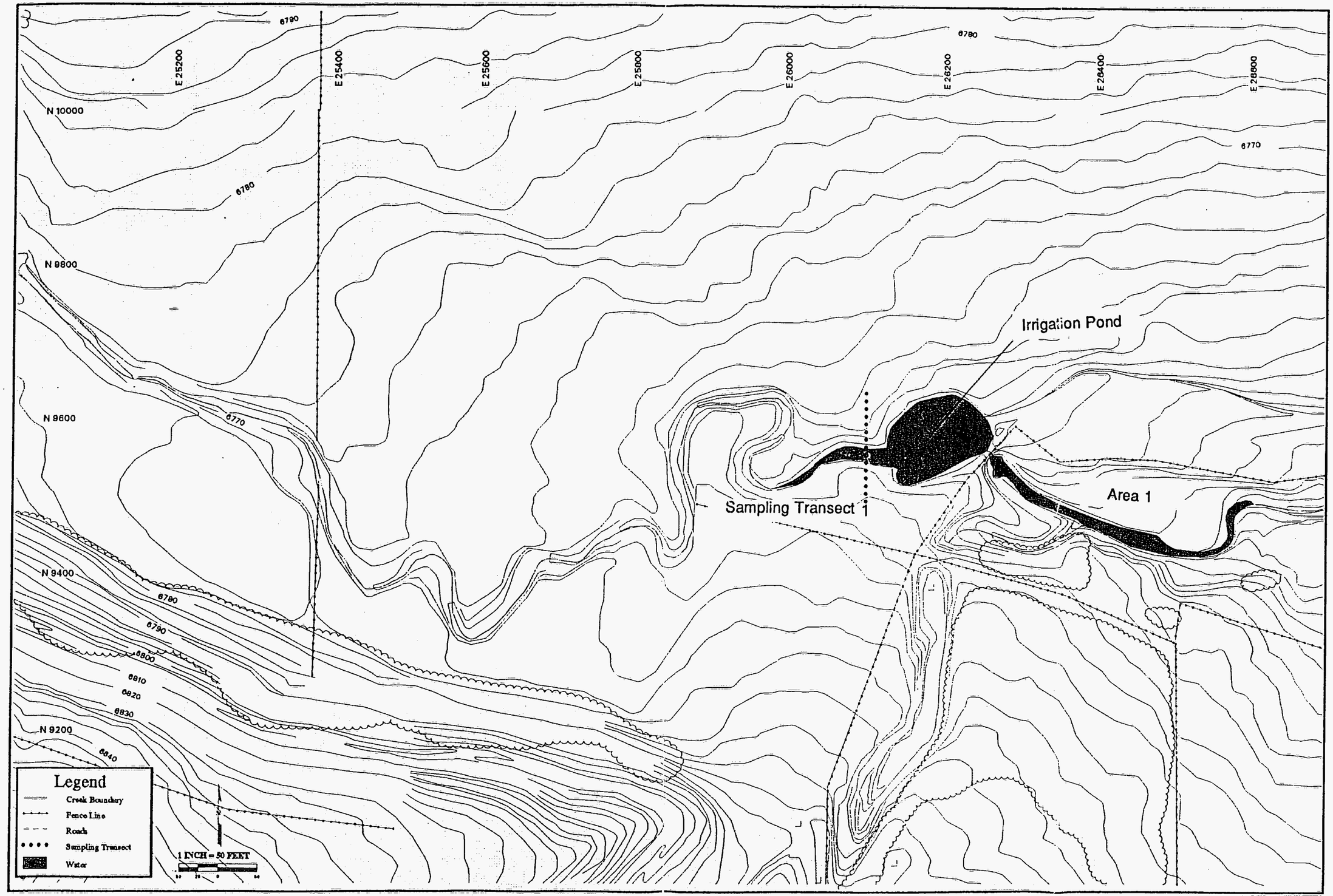
DIRECTIVE NO. MSGRAP 95-05

Figure 2

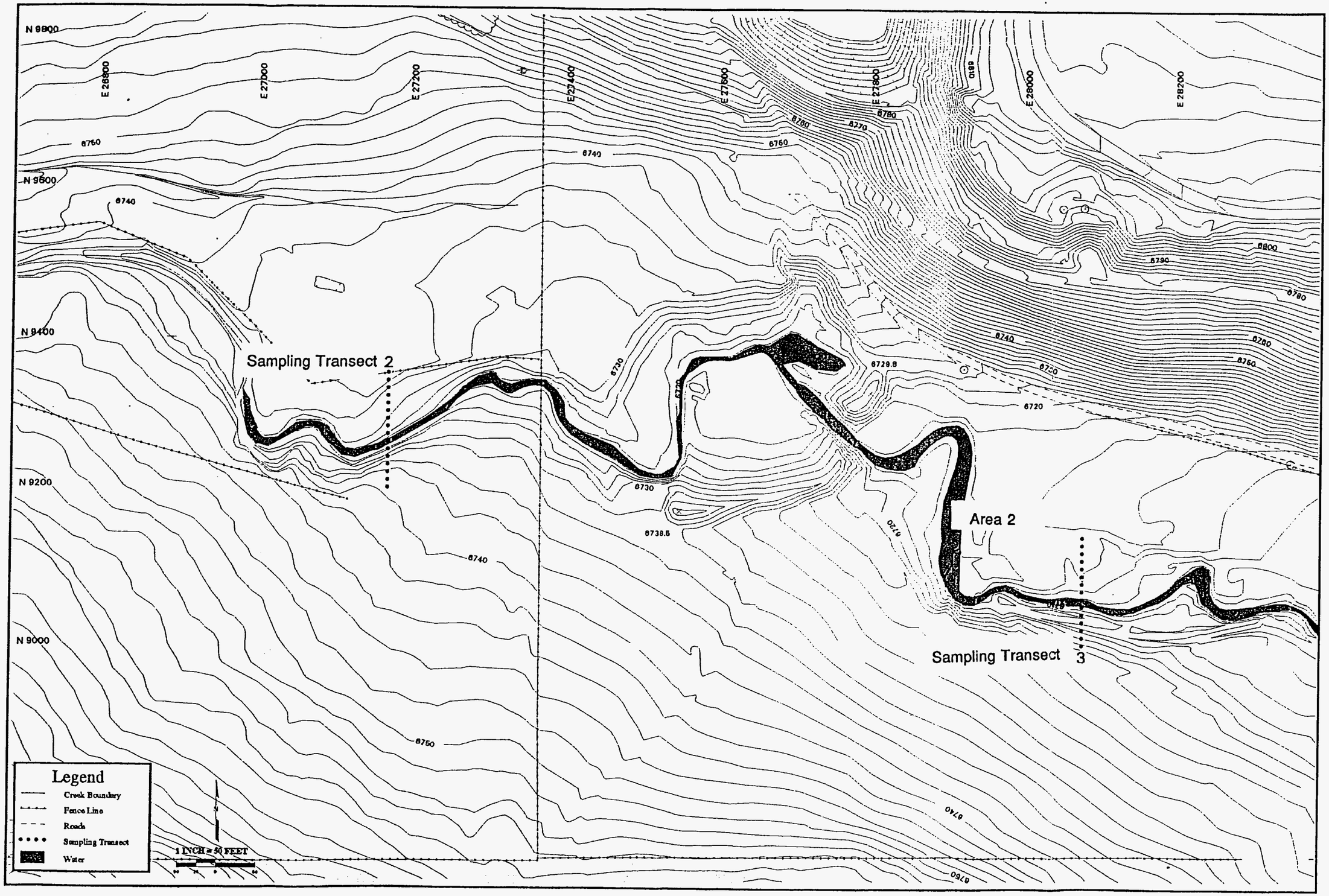
Swallow Sampling Site Beaver Pond



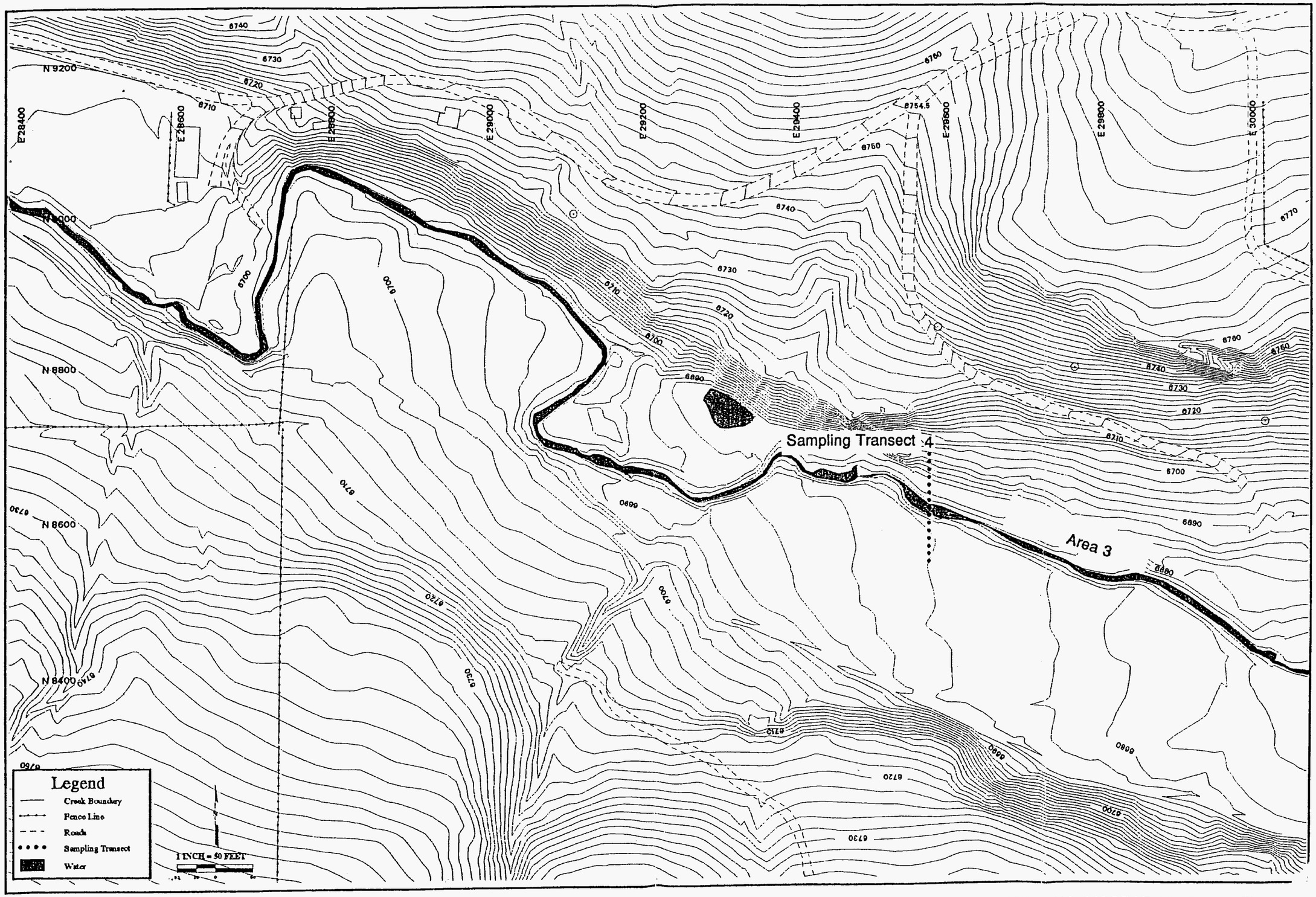
DIRECTIVE NO. MSGRAP 95-05 Figure 3

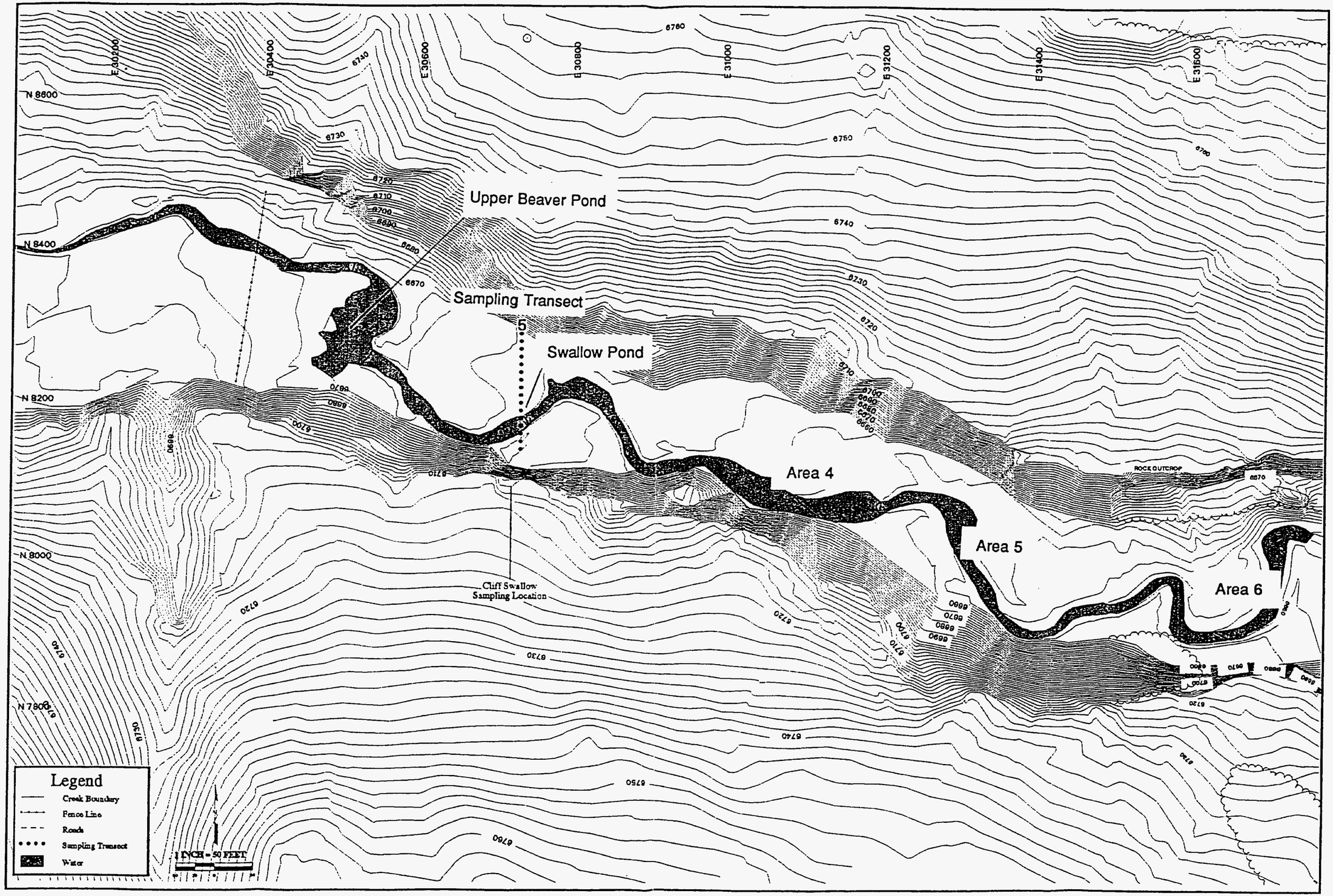


DIRECTIVE NO. MSGRAP 95-05 Figure 4

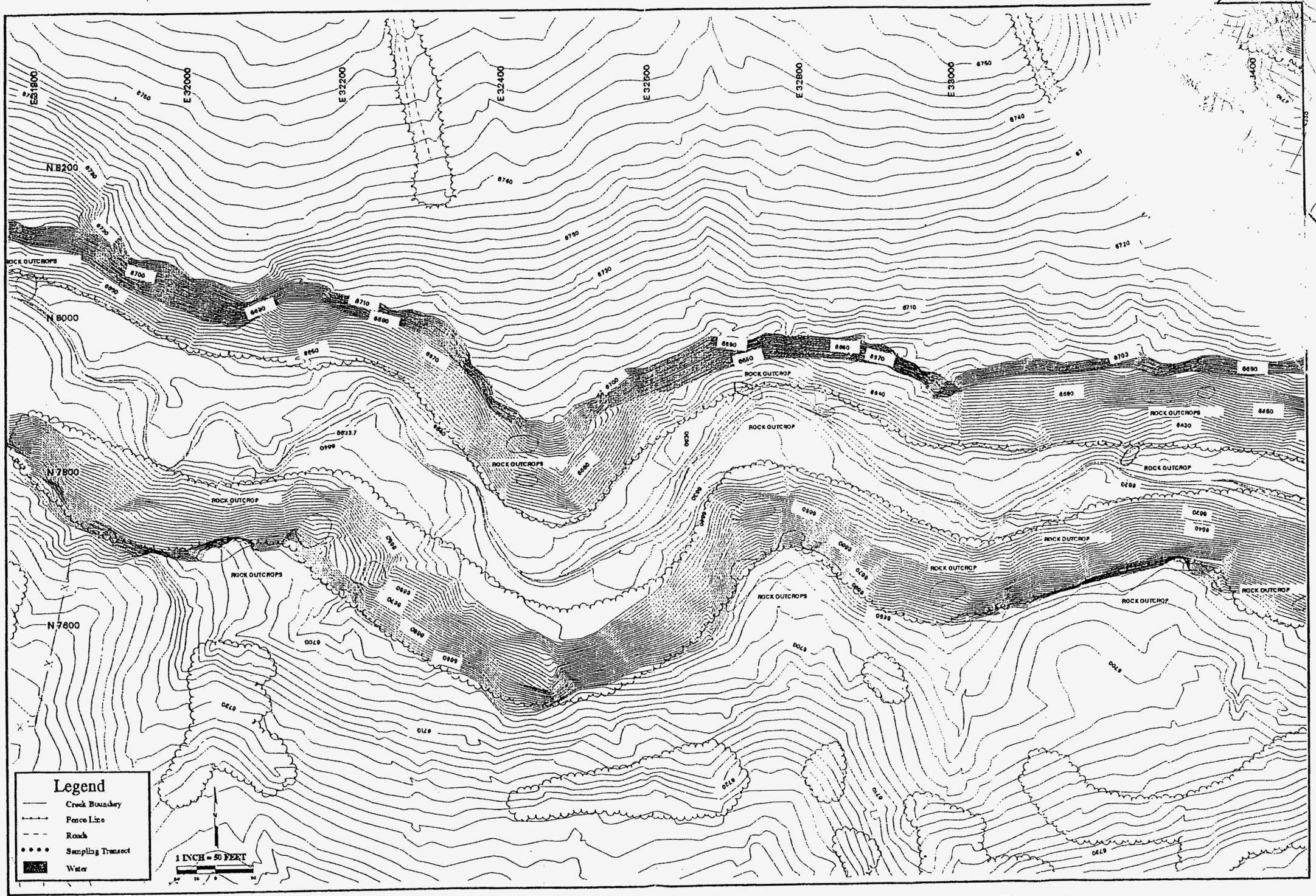


DIRECTIVE NO. MSGRAP 95-05 Figure 5


N 9200
N 9000
N 8800
N 8600
N 8400
E 28400
E 28600
E 28800
E 29000
E 29200
E 29400
E 29600
E 29800
E 30000
Sampling Transect 4
Area 3
Legend
Creek Boundary
Fence Line
Roads
Sampling Transect
Water
1 INCH = 50 FEET

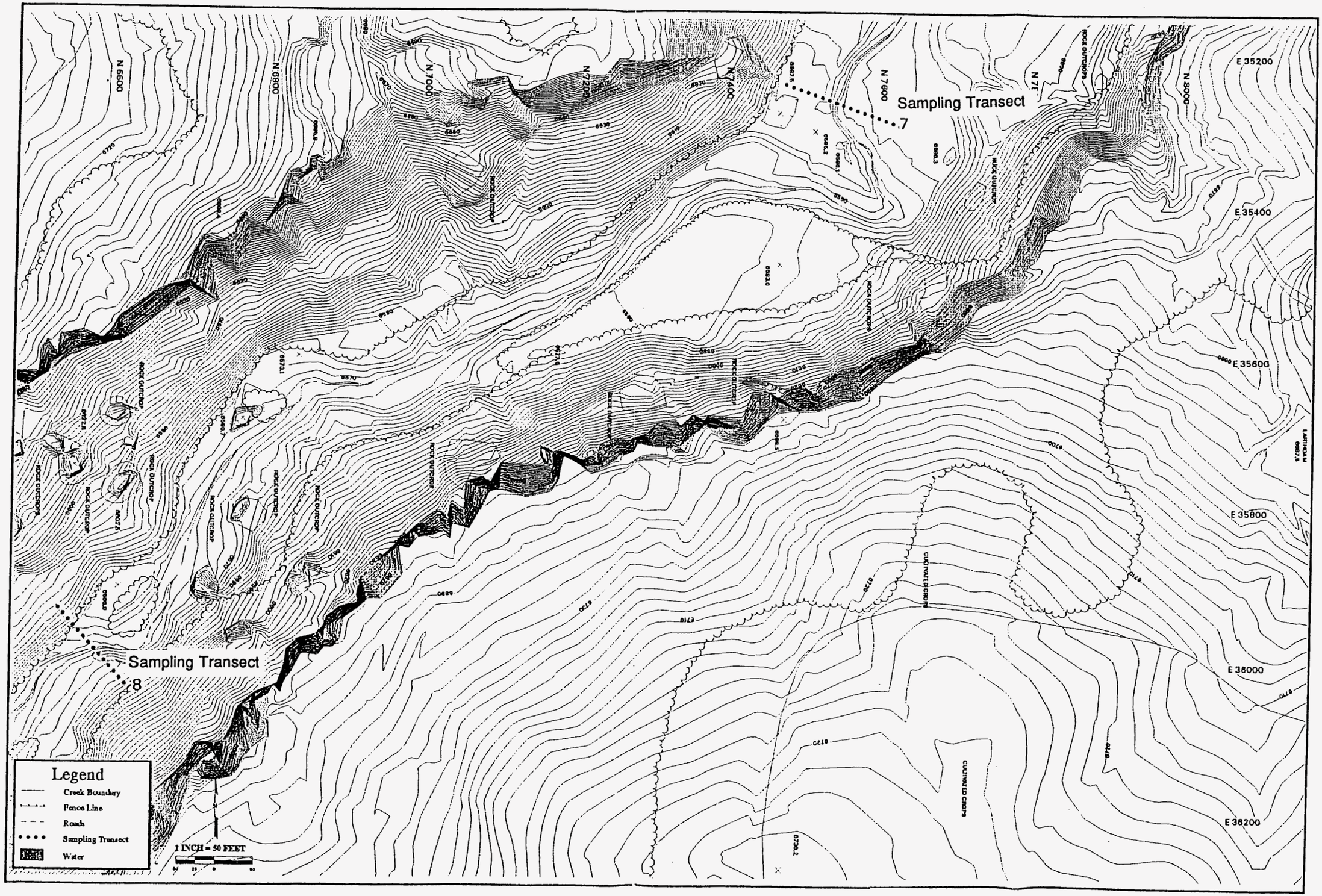


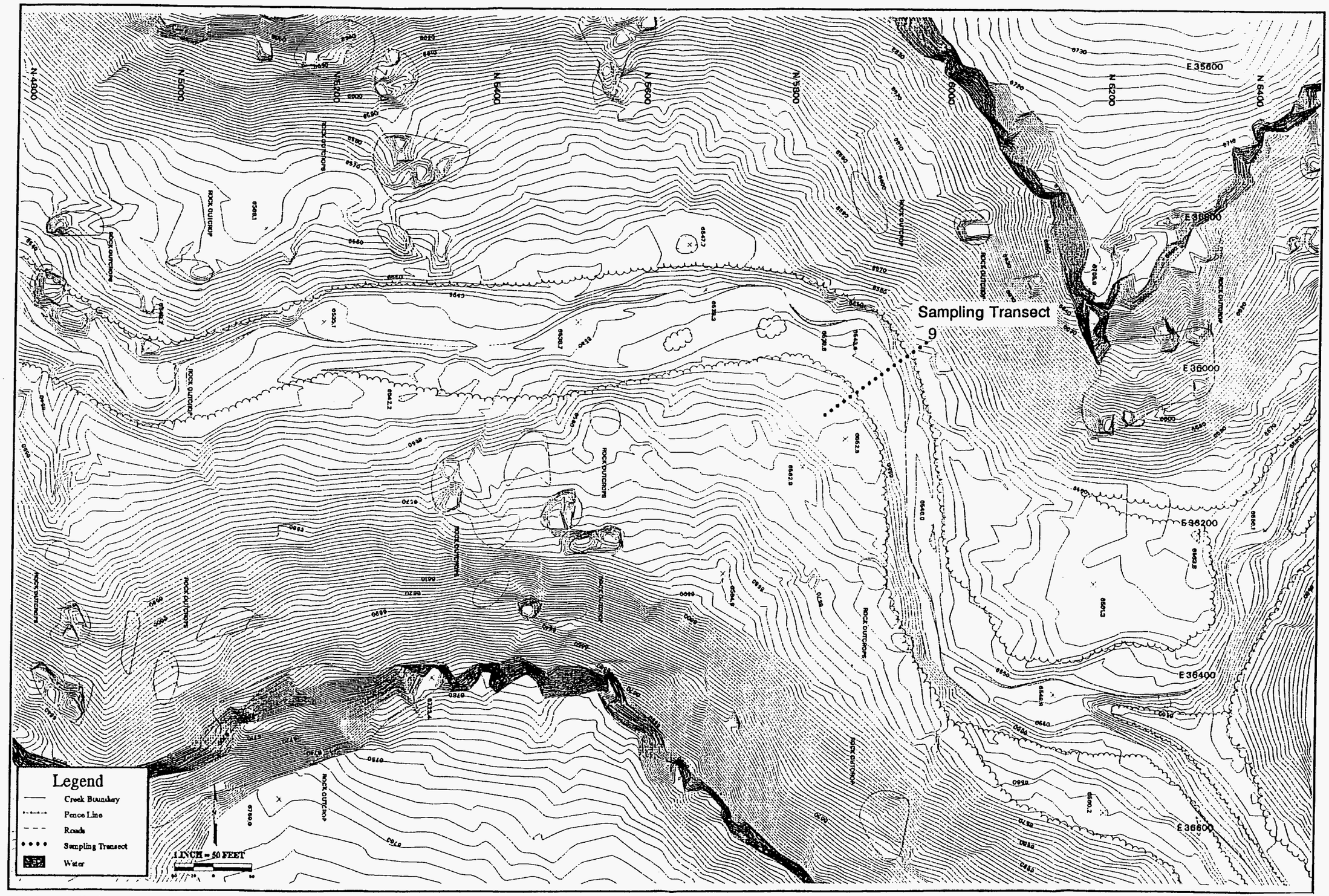
DIRECTIVE NO. MSGRAP 95-05 Figure 7



DIRECTIVE NO. MSGRAP 95-05 Figure 8

DIRECTIVE NO. MSGRAP 95-05 Figure 9


Sampling Transect
7
Sampling Transect
8
N 6600
N 6800
N 7000
N 7200
N 7400
N 7600
N 8000
E 35200
E 35400
E 35600
E 35800
E 36000
E 36200
ROCK OUTCROP
CULTIVATED CROPS
Legend
Creek Boundary
Fence Line
Roads
Sampling Transect
Water
1 INCH = 50 FEET



DIRECTIVE NO. MSGRAP 95-05 Figure 11

Seq Num	Sample Loc I.D.	Depth (in.)	Meas. Type	Ra-226 (pCi/g) Non-Deconv.	Ra-226 (pCi/g) Deconv.	Survey Coord. North (ft.)	Survey Coord. East (ft.)	Comments
118	IP-01	00	TC	7.0	7.0			IPSD95-01
		06	TC	3.9	3.0			
		12	TC	4.0	4.0			
		18	TC	4.0	4.2			
		24	TC	3.2	3.0			
		30	TC	3.2	2.7			
		36	TC	5.1	5.0			
		42	TC	7.5	8.1			
		48	TC	7.8	7.9			
		54	TC	7.7	8.1			
		60	TC	6.0	5.5			
		66	TC	6.1	5.3			
		72	TC	9.0	9.3			
		78	TC	10.8	10.8			
119	IP-02	00	TC	1.6	1.6			IPSD95-02
		06	TC	3.2	3.0			
		12	TC	5.7	6.7			
		18	TC	4.6	4.5			
		24	TC	3.8	3.6			
		30	TC	3.8	3.9			
		36	TC	3.6	3.7			
		42	TC	2.9	2.8			
		48	TC	2.5	2.3			
		54	TC	2.7	2.3			
		60	TC	4.2	4.4			
		66	TC	4.8	4.4			
		72	TC	6.8	7.4			
		78	TC	6.7	6.7			
120	IP-03	00	TC	1.7	1.7			IPSD95-03
		06	TC	3.7	4.3			
		12	TC	3.6	3.6			
		18	TC	3.5	3.4			
		24	TC	3.6	3.6			
		30	TC	3.7	3.7			
		36	TC	3.8	3.9			
		42	TC	3.4	3.2			
		48	TC	3.8	3.6			
		54	TC	4.8	4.8			
121	IP-04	00	TC	3.1	3.1			IPSD95-04
		06	TC	4.2	4.6			
		12	TC	4.0	3.8			

Irrigation Pond

Table 2
Radium Concentrations at Pond Sediment Locations

Seq Num	Sample Loc I.D.	Depth (in.)	Meas. Type	Ra-226 (pCi/g) Non-Deconv.	Ra-226 (pCi/g) Deconv.	Survey Coord. North (ft.)	Survey Coord. East (ft.)	Comments	
121	IP-04	18	TC	4.4	4.6				
		24	TC	4.0	4.0				
		30	TC	3.7	2.8				
		36	TC	6.9	2.4				
		42	TC	26.6	29.8				
		48	TC	34.5	38.6				
		54	TC	27.2	27.2				
122	IP-05	00	TC	3.2	3.2			IPSD95-05	
		06	TC	4.7	5.2				
		12	TC	4.3	4.2				
		18	TC	4.1	4.0				
		24	TC	4.2	4.3				
		30	TC	3.9	3.8				
		36	TC	3.8	3.8				
		42	TC	3.8	3.6				
		48	TC	4.4	4.8				
		54	TC	3.7	3.7				
123	BP-01	00	TC	3.9	3.9			BPSD95-01	Swallow Pond
		06	TC	6.6	7.1				
		12	TC	7.6	8.0				
		18	TC	7.0	6.9				
		24	TC	6.8	6.5				
		30	TC	7.7	8.2				
		36	TC	6.7	6.3				
		42	TC	7.1	6.8				
		48	TC	8.6	9.4				
		54	TC	7.0	6.8				
		60	TC	6.3	6.3				
124	BP-02	00	TC	1.1	1.1			BPSD95-02	Swallow Pond
		06	TC	3.2	2.7				
		12	TC	7.2	8.1				
		18	TC	7.8	8.5				
		24	TC	5.8	5.4				
		30	TC	5.3	5.1				
		36	TC	5.4	5.5				
		42	TC	5.3	5.3				
		48	TC	5.3	5.4				
		54	TC	4.9	4.8				
		60	TC	5.0	5.0				

Seq Num	Sample Loc I.D.	Depth (in.)	Meas. Type	Ra-226 (pCi/g) Non-Deconv.	Ra-226 (pCi/g) Deconv.	Survey Coord. North (ft.)	Survey Coord. East (ft.)	Comments	
125	BP-03	00	TC	4.7	4.7			BPSD95-03	Swallow Pond
		06	TC	5.1	5.3				
		12	TC	4.9	5.1				
		18	TC	3.9	3.9				
		24	TC	3.0	2.9				
		30	TC	2.5	2.4				
		36	TC	2.5	2.3				
		42	TC	3.3	3.4				
		48	TC	3.8	4.0				
		54	TC	3.7	3.7				
126	UBP-01	00	TC	1.8	1.8			UBPSD95-01	Upper Beaver Pond
		06	TC	2.8	3.2				
		12	TC	2.4	2.3				
		18	TC	2.5	2.6				
		24	TC	2.3	2.3				
		30	TC	2.1	2.0				
		36	TC	2.2	2.2				
		42	TC	2.2	2.2				
		48	TC	2.3	2.3				
127	UBP-02	00	TC	6.0	6.0			UBPSD95-02	
		06	TC	18.3	16.2				
		12	TC	38.2	39.7				
		18	TC	52.7	66.5				
		24	TC	16.4	9.1				
		30	TC	6.9	5.1				
		36	TC	4.1	3.7				
		42	TC	2.9	2.6				
		48	TC	2.7	2.6				
		54	TC	2.8	2.8				
		60	TC	2.9	3.1				
		66	TC	2.4	2.2				
		72	TC	2.5	2.5				
128	UBP-03	00	TC	2.7	2.7			UBPSD95-03	
		06	TC	2.8	2.8				
		12	TC	2.9	3.0				
		18	TC	2.8	2.8				
		24	TC	2.6	2.5				

Table 2
Radium Concentrations at Pond Sediment Locations

Seq Num	Sample Loc I.D.	Depth (in.)	Meas. Type	Ra-226 (pCi/g) Non-Deconv.	Ra-226 (pCi/g) Deconv.	Survey Coord. North (ft.)	Survey Coord. East (ft.)	Comments
128	UBP-03	36	TC	2.6	2.7			
		42	TC	2.2	2.1			
		48	TC	2.3	2.3			
		54	TC	2.3	2.3			

Measurement Types:
DH = Downhole Survey
DS = Delta Scintillometer
GB = GAD-6 Borehole
GB = GAD-6 Surface
OC = Soil Sample by Opp. Crys. Sys.
SS = Soil Sample by Laboratory Analysis
TC = Total Count Borehole

Notes:
DC = Depth of Contamination
[n] = Reading Taken n-Inches Above Floor or Ground
Date of Survey = 08-23-95
Team Leader = HL

PROGRAM DIRECTIVE

Monticello Operable Unit III Directive Directive No. MSGRAP 96-01

PROGRAM MANAGER: Wanda Busby

INITIATED BY: Alix Craig

EFFECTIVE DATE: July 1, 1996 **EXPIRATION DATE:** Not Applicable

SUBJECT: Revision to terrestrial invertebrate sampling task.

JUSTIFICATION FOR PROGRAM DIRECTIVE AND ASSOCIATED TASK CHANGES: Through consultation among DOE, EPA, and UDEQ it was determined that the terrestrial invertebrate sampling protocol presented in the Sampling and Analysis Plan (June 1996) should be changed to provide more useful data in a more timely manner. Under the current plan, flying, ground-dwelling, and vegetation-dwelling invertebrates are composited to produce one 35-gram sample at each ecological transect. This type of sampling has been determined to have two potential flaws. First, it will take an extensive field effort to obtain 35 grams of terrestrial invertebrates, particularly when a large part of the sample must be composed of low-mass flying species such as gnats. Second, the resulting analytical data will not distinguish between contaminant concentrations in flying insects (the expected food source for the spotted bat and the southwestern willow flycatcher) and contaminant concentrations in ground-dwelling and vegetation-dwelling invertebrates (the expected food source of the deer mouse). This lack of distinction will add uncertainty to the ecological component of the baseline risk assessment.

ORGANIZATIONS AFFECTED: Environmental Services, Field Services, Analytical Chemistry Laboratory

PLANS, MANUALS, AND PROCEDURES AFFECTED: Sampling and Analysis Plan for Additional Characterization of Middle and Lower Montezuma Creek (P-GJPO-928), Draft Final, June 1996.

DIRECTIVE: The terrestrial invertebrate sampling protocol will be changed such that flying insects are collected separately from ground-dwelling or vegetation-dwelling invertebrates. Flying insects will be collected within the entire study area and composited into a single sample. Ground-dwelling and vegetation-dwelling invertebrate samples will be collected at the existing transects to provide eight individual samples (five from Montezuma Creek and three from Verdure Creek). Existing partial samples will be sorted by Environmental Services and Field Services staff to separate flying insects from ground-dwelling and vegetation-dwelling invertebrates.

PROGRAM DIRECTIVE

Monticello Operable Unit III Directive — Directive No. MSGRAP 96-01

REVIEW AND CONCURRENCE:

William Merrill/OU III Team Leader (Rust) — Date 7/1/96

APPROVAL TO ISSUE:

Wanda Busby/Program Manager (Rust) for WSB — Date 7/1/96

Mary Ann Rondinella/Project Manager (DOE) — Date 7/2/96

DISTRIBUTION: (managed through Records Management)

A. Craig
D. Dille
D. Ealey
M. Gilfillan
K. McClellen
W. Merrill
F. Pearl
E. Reid
D. Richardson
L. Duncan (Program Directive File)
Records Management File Index MSGW 1.14
M.A. Rondinella (DOE-GJPO) 2 copies
P. Mushovic (US EPA) 2 copies
D. Bird (UDEQ) 2 copies

PROGRAM DIRECTIVE

Monticello Operable Unit III Directive Directive No. MSGRAP 96-02

PROGRAM MANAGER: Wanda Busby

INITIATED BY: Alix Craig

EFFECTIVE DATE: July 10, 1996 **EXPIRATION DATE:** Not Applicable

SUBJECT: Additional revision to terrestrial invertebrate sampling task.

JUSTIFICATION FOR PROGRAM DIRECTIVE AND ASSOCIATED TASK CHANGES: Through consultation among DOE, EPA, and UDEQ it was determined that the terrestrial invertebrate sampling protocol presented in the *Draft Final Operable Unit III Sampling and Analysis Plan for Additional Characterization of Middle and Lower Montezuma Creek* (June 1996) should be changed to provide more useful data in a more timely manner. According to the Sampling and Analysis Plan, samples will be 35 grams each. However, it has been very difficult to obtain the required sample mass, because of drought conditions and the fact that samples are being collected early in the season to accomodate the project schedule. As a result, DOE, EPA, and UDEQ have concurred that the required sample mass will be reduced from 35 grams to 14 grams. DOE, EPA, and UDEQ have further concurred that samples of ground- and vegetation-dwelling terrestrial invertebrates collected at transects 22 and 23 should be composited into a single sample for radiologic analysis. The consequence of the reduced sample mass is that the detection limit for the uranium decay series isotopes detected by total gamma analysis will increase from 1 picoCurie per gram (pCi/g) to approximately 2 pCi/g. If these changes are not made, additional project costs will be incurred and the completion of the ecological component of the baseline risk assessment will be delayed.

ORGANIZATIONS AFFECTED: Environmental Services, Field Services, Analytical Chemistry Laboratory

PLANS, MANUALS, AND PROCEDURES AFFECTED: *Sampling and Analysis Plan for Additional Characterization of Middle and Lower Montezuma Creek* (P-GJPO-928), Draft Final, June 1996 and Program Directive MSGRAP 96-01 (July 1996).

DIRECTIVE: The terrestrial invertebrate sampling protocol will be changed such that each sample is composed of at least 14 grams of terrestrial invertebrates. This lower sample mass will result in a gross gamma radioactivity method detection limit of approximately 2.0 pCi/g rather than approximately 1.0 pCi/g. Method detection limits for gross alpha and gross beta radioactivity and for metals will not differ from those listed in the Sampling and Analysis Plan (P-GJPO-928).

At transects 14, 21, and 24, and for flying insects in Montezuma Creek and Verdure Creek, the 14-gram minimum sample mass has been obtained using the original methods outlined in the Sampling and Analysis Plan and Directive MSGRAP 96-01. To obtain the minimum sample mass at transects 22 and 23, samples from the two transects will be combined for radiological analysis only; metals analyses for these transects will be performed separately. To obtain the minimum sample mass, additional pitfall traps will be set at at transects 15, 16, and 25.

PROGRAM DIRECTIVE

Monticello Operable Unit III Directive — Directive No. MSGRAP 96-01

REVIEW AND CONCURRENCE:

William Merrill/OU III Team Leader (Rust) — Date 7/11/96

APPROVAL TO ISSUE:

Wanda Busby/Program Manager (Rust) — Date 7/11/96

Mary Ann Rondinella/Project Manager (DOE) — Date 7/11/96

DISTRIBUTION: (managed through Records Management)

A. Craig
D. Dille
D. Ealey
M. Gilfillan
K. McClellen
W. Merrill
F. Pearl
E. Reid
D. Richardson
L. Duncan (Program Directive File)
Records Management File Index MSGW 1.14
M.A. Rondinella (DOE-GJPO) 2 copies
P. Mushovic (US EPA) 2 copies
D. Bird (UDEQ) 2 copies

PROGRAM DIRECTIVE

Monticello Mill Tailings Site - MSGRAP Directive **Directive No.** MSGRAP-96-03

INITIATED BY: Kristen McClellen, MSGRAP OU III Project Manager

EFFECTIVE DATE: October 16, 1996 **EXPIRATION DATE:** December 31, 1996

SUBJECTS: Revised groundwater and surface-water monitoring locations. Revision of analyte list, analytical methods, and method detection limits.

JUSTIFICATION FOR PROGRAM DIRECTIVE AND ASSOCIATED NEW TASK CHANGES:

1. Four new groundwater monitoring wells were added to the sampling network in April 1996 to characterize the groundwater in the western portion of the millsite in response to high contaminant levels in well 36SE93-201-2. Monitoring results from these sites will be used to support the OU III remedial investigation.

2. Surface water sampling location Cabin Spring will not be sampled because sufficient data has been collected to characterize this location.

3. The analyte list for ground water and surface water sampling will be revised to focus on analytes that have been determined to be significant to the annual monitoring effort, and selected analytical methods will be revised to obtain lower detection limits.

ORGANIZATION(S) AFFECTED: Field Samplers (Environmental Programs and Field Services), Analytical Laboratory.

PLANS, MANUALS, AND PROCEDURES AFFECTED: The following, September 1995 Draft Final, project documents are affected by the changes:

P-GJPO-758, MMTS OU III, Surface- and Ground-Water RI/FS Work Plan
P-GJPO-759, MMTS OU III, Surface- and Ground-Water RI/FS Field Sampling Plan
P-GJPO-123.2, MMTS OU III, Surface- and Ground-Water RI/FS QA Project Plan

Details of specific sections, pages and paragraphs to be revised are not presented herein. The summary information and tables provided under the Directive will be sufficient to guide field personnel in obtaining the appropriate measurements and samples.

DIRECTIVE:

1. Monitoring wells 31SW91-35, 31SW91-50, 31SW91-55, and 36SE91-58 (Attachment 1) will be sampled.

2. Cabin Spring location will not be sampled.

3. The revised analyte list, analytical methods, and method detection limits are shown in Attachment 2.

Attachment 1 - October 1996 Sampling Locations

Upgradient Wells
92-01
92-02
92-03
92-04
92-05
92-06
92-13

Millsite Wells
82-30B
82-40A
82-42
82-31B-E
31SW91-03
31SW91-14
31SW91-23
31SW91-35
31SW91-50
31SW91-55
36SE91-58
36SE93-201-2
93-01

Crossgradient Wells
31NE93-205
95-07

Downgradient Wells
82-07
88-85
92-07
92-08
92-09
92-11
P92-02
P92-04
P92-09
95-01
95-03
92-10
95-02
95-04
95-06
95-08
92-12
83-70

Surface Locations
SW92-01
SW92-02
SW92-03
SW92-04
SW92-05
SW92-06
SW92-07
SW92-08
SW92-09
SW94-01
SW95-01
Carbonate Seep
W-2
North Drainage
Slade Spring
W-4
Sorenson
Montezuma Canyon

Attachment 2

Analytical Parameter	Method	Analytical Method[1]
Metals[2]	**(µg/L)**	
Aluminum	50	CLP Method 200.7
Arsenic	1.0	EPA SW-846 6020
Cobalt	7.5	CLP Method 200.7
Copper	2.2	EPA SW846 6020
Manganese	1.0	CLP Method 200.7
Molybdenum	1.0	EPA SW846 6020
Selenium	2.3	EPA SW846 6020
Vanadium	6.4	CLP Method 200.7
Zinc	9.9	CLP Method 200.7
Lead	0.8	EPA SW846 6020
Total Dissolved Solids (filterable residue)	10,000	EPA Method 160.1
Major Anions		
Chloride	200	EPA Method 300
Sulfate	200	
Fluoride	200	
Nitrate (NO_3+NO_2 as N)	200	
Nitrite (31W91-23 only)	200	
Major Cations		
Ammonium	20	
Calcium	100	EPA Method 350.1
Magnesium	100	CLP Method 200.7
Potassium	700	
Sodium	600	
Radionuclides	**(pCi/L)**	
Lead-210	2.0	GJO Method RC-6
Radium-226	0.5	GJO Method RC-5
Radon-222	20.0	GJO Method RC-17
Thorium-230	0.3	GJO Method RC-1
Uranium-234, Uranium-235 and Uranium-238	0.3	GJO Method RC-1
Gross Alpha Activity	1.0	GJO Method RC-3
Gross Beta Activity	1.0	GJO Method RC-3

[1] GJO Method is the DOE Grand Junction Office Method. These methods were previously identified as Geotech or Rust Geotech Methods in various project documents. This change is a name change only and not a change to the actual method of analysis.

[2] Total and dissolved metals fractions for surface water samples; total metals fraction for ground-water samples

PROGRAM DIRECTIVE

Monticello Mill Tailings Site - MSGRAP Directive **Directive No.** MSGRAP-97-01

INITIATED BY: Kristen McClellen, MSGRAP OU III Project Manager

EFFECTIVE DATE: October 13, 1997 **EXPIRATION DATE:** December 31, 1997

SUBJECTS: Surface-water sampling at 5 new locations, and survey of stream elevation and stream discharge measurements at 7 new locations.

JUSTIFICATION FOR PROGRAM DIRECTIVE AND ASSOCIATED NEW TASK CHANGES:

1. Downgradient of the Sorenson site there is a steady decrease of uranium concentration in Montezuma Creek; however, the distance between locations and the locations with respect to soil and sediment hot spots are not ideally chosen for determining if there is a temporary increase in concentrations in the creek due to the hot spots. Therefore, 5 new locations on Montezuma Creek will be sampled to provide water quality data in close proximity to the hot spots, which will allow assessment of impacts to Montezuma Creek water-quality from the hot spots.

2. To further define the ground water and surface water interaction in Montezuma Creek, including impacts of ground water quality on surface water quality, a better understanding of gaining and loosing reaches of Montezuma Creek is needed. Therefore, a comparison of creek elevations with adjacent alluvial wells will be made to determine if the creek is gaining or loosing at that location. In addition, discharge measurements will be conducted at each surveyed creek location.

3. Discrepancies exist in the *Annual Monitoring Program* plan regarding the frequency of repeat ground-water level measurements. The correct frequency requirement is one repeat ground-water level measurement for every 20 measurements taken.

ORGANIZATION(S) AFFECTED: Field Samplers (Geoscience), Surveyors (Field Services) and the GJO Analytical Laboratory.

PLANS, MANUALS, AND PROCEDURES AFFECTED: MMTS OU III Annual Monitoring Program, September 1997.

Details of specific sections, pages and paragraphs to be revised are not presented herein. The summary information and tables provided under the Directive will be sufficient to guide field personnel in obtaining the appropriate measurements and samples.

DIRECTIVE:

1. Collect surface water samples from the following locations (map attached):

   - Upper Montezuma Creek - downgradient of the hot spot located at E28100
   - Upper Montezuma Creek - downgradient of the hot spot located at E30700
   - Upper/Middle Montezuma Creek - at the boundary between Upper and Middle Montezuma Creek
   - Middle Montezuma Creek downgradient of the hot spot located at E32100
   - Lower Montezuma Creek - downgradient of the hotspot located at E34500

2. Survey Montezuma Creek elevations at locations adjacent to selected wells and measure the water level in the wells. The creek elevation and the water level in the adjacent well should be measured concurrently. Selected wells include 92-07, 92-08, 82-07, 92-09, 95-01, 95-03, and 82-09. Measure creek discharge at each survey location.

Review and Concurrence (Name/Title):

K. L. McClellen, OU III Project Manager — Date: 10-1-97

S. E. Campbell, Field Supervisor — Date: 10-1-97

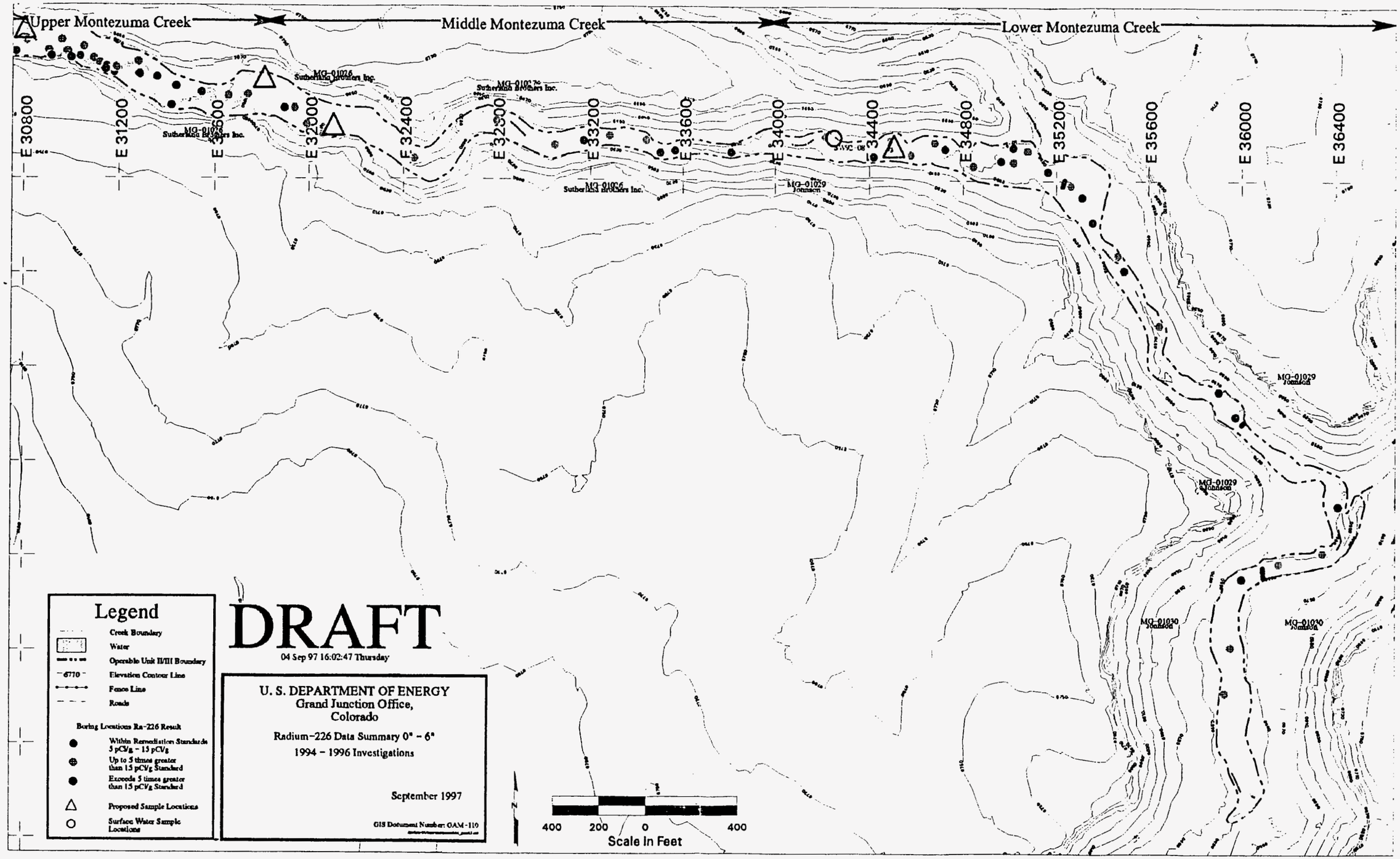
F. A. Pearl, QA Coordinator — Date: 10-1-97

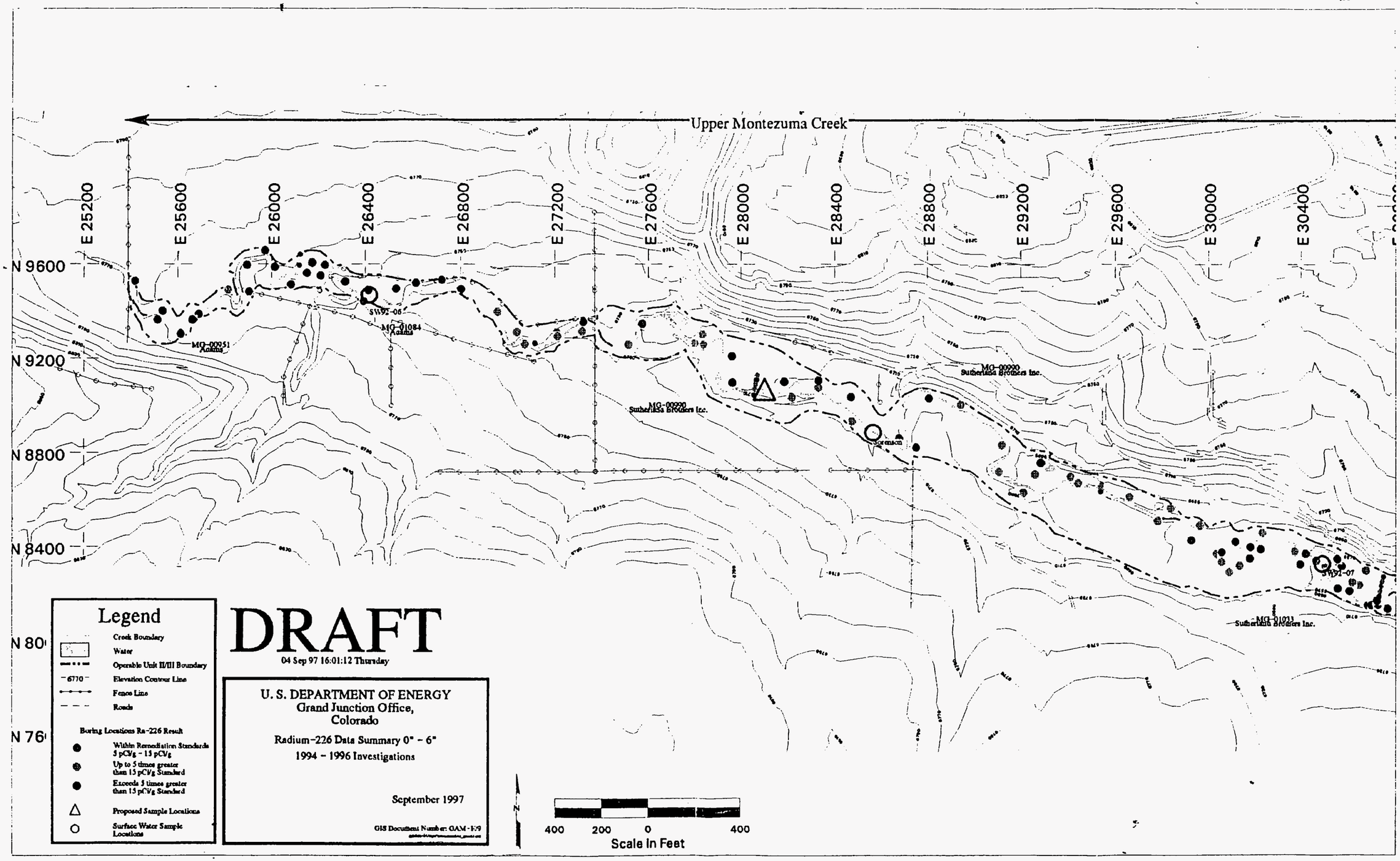
R. B. Chessmore, GJO Analytical Laboratory — Date: 10/1/97

Program Manager Approval to Issue:

M. C. Butherus, Monticello Program Manager — Date: 10/1/97

DISTRIBUTION: (w/ attachments)
Program Managers Directive Log
Document holders to referenced Planning Documents ~~(distribution through Records Management)~~
Records file MSGW 1.14


Upper Montezuma Creek
Middle Montezuma Creek
Lower Montezuma Creek
E 30800
E 31200
E 31600
E 32000
E 32400
E 32800
E 33200
E 33600
E 34000
E 34400
E 34800
E 35200
E 35600
E 36000
E 36400
MG-01026 Sutherland Brothers Inc.
MG-01027c Sutherland Brothers Inc.
MG-01029 Johnson
MG-01030 Johnson
Legend
Creek Boundary
Water
Operable Unit II/III Boundary
6770 Elevation Contour Line
Fence Line
Roads
Boring Locations Ra-226 Result
Within Remediation Standards 5 pCi/g - 15 pCi/g
Up to 5 times greater than 15 pCi/g Standard
Exceeds 5 times greater than 15 pCi/g Standard
Proposed Sample Locations
Surface Water Sample Locations
DRAFT
04 Sep 97 16:02:47 Thursday
U. S. DEPARTMENT OF ENERGY
Grand Junction Office,
Colorado
Radium-226 Data Summary 0" - 6"
1994 - 1996 Investigations
September 1997
GIS Document Number: GAM-110
N
400 200 0 400
Scale in Feet


Upper Montezuma Creek
E 25200
E 25600
E 26000
E 26400
E 26800
E 27200
E 27600
E 28000
E 28400
E 28800
E 29200
E 29600
E 30000
E 30400
N 9600
N 9200
N 8800
N 8400
N 80
N 76
SW97-06
MG-01084
Adams
MG-00951
Adams
MG-00990
Sutherland Brothers Inc.
MG-00990
Sutherland Brothers Inc.
Sorenson
SW97-07
MG-01033
Sutherland Brothers Inc.
Legend
Creek Boundary
Water
Operable Unit II/III Boundary
6770
Elevation Contour Line
Fence Line
Roads
Boring Locations Ra-226 Result
Within Remediation Standards 5 pCi/g - 15 pCi/g
Up to 5 times greater than 15 pCi/g Standard
Exceeds 5 times greater than 15 pCi/g Standard
Proposed Sample Locations
Surface Water Sample Locations
DRAFT
04 Sep 97 16:01:12 Thursday
U. S. DEPARTMENT OF ENERGY
Grand Junction Office,
Colorado
Radium-226 Data Summary 0" - 6"
1994 - 1996 Investigations
September 1997
GIS Document Number: GAM - 1-9
N
400 200 0 400
Scale In Feet

4-30 (14) OU III AR 576

Program Directive

MMTS - OU III **Program/Project** **Directive No.** MSG-99-01

Task Order No. MAC99-03 (Task No. 301508001)

Initiated By: Tim Bartlett, Field Supervisor, MACTEC-ERS

Directive Subject: (1) Changes to ground water sample and water level measurement locations. (2) Temporary change to surface water location W-4 for the collection of unfiltered samples for metals and radionuclide analyses.

Justification and Associated New Task Changes: (1) Installation of temporary wells downgradient of the PeRT wall have been completed (location map and Well Data Summary attached) allowing for preliminary information to be gathered during the July sampling event. (2) Location W-4 is in an area of reconstruction and not accessible for sampling at this time.

Organization(s) Affected: Field sampling personnel and GJO Analytical Laboratory

Affected Documents:
MMTS, OU III, Interim Remedial Action Work Plan, (Draft) May 1999, (MAC-MSG 2.2.4)

MMTS, OU III, Interim Remedial Action Surface Water and Ground Water Monitoring Plan, Rev. 2, July 1999 (MAC-MSGRAP 1.3.5-1)

Directive: (1) Add temporary well locations T99-01, T99-03, and T99-05 and existing well locations 92-09, 95-03, P92-01, and P92-02 to the July 1999 quarterly sampling event.

Measure the water levels in temporary wells T99-01, T99-02, T99-03, T99-05, T99-06, T99-07, and T99-10. Water levels for the existing wells will be measured as specified in the *OU III, Interim Remedial Action Surface Water and Ground Water Monitoring Plan*. Temporary wells T99-01, T99-03, and T99-05 were the only locations where water was present at the time of drilling and installation in June 1999. If water is present in wells T99-02, T99-06, T99-07, and T99-10 samples will be collected. Sampling and analysis requirements for the temporary wells and additional existing wells are specified in Section 3.1.5 of the *OU III Interim Remedial Action Work Plan*.

(2) Collect unfiltered samples for metals and radionuclide analysis at location SW92-06 in place of the W-4 location identified in Section 4.3.2 of the *OU III, Interim Remedial Action Surface Water and Ground Water Monitoring Plan*. If SW92-06 is not accessible the samples should be collected from the Sorenson Site location.

Review and Concurrence:

Kristen L. McClellen

Kristen McClellen, OU III Project Manager

Task Order Manager Approval to Issue:

7/19/99

Mike Butherus, Manager, Major Projects

Effective Date: July 19, 1999 **Expiration Date:** September 30, 1999

Distribution: w/ Attachments
Task Order Managers Directive Log
Jalane Glasgow - Record File MSG 1.14
Holders of all affected documents
Cathy Kelleher (2 copies) - Project Administrative Record

F:\HOME\F40091\OU3\msg9901DIR.doc

Monticello IRA Temporary Well Data Summary.

Location	Northing	Easting	Stickup [ft]	Depth Drilled [ft]	Bottom of Screen [ft bgs]	Bottom of Screen [ft btoc]	Depth to Bedrock [ft bgs]	Depth to Water [ft btoc]	Saturated Thickness [ft]
T99-01	9824.8	24580.0	1.28	30	28.8	30.1	29	27.71	2.6
T99-02	9708.6	24530.3	3.53	31.8	31.6	35.1	31	DRY	0.0
T99-03	9597.8	24484.9	2.44	24.5	22.8	25.2	22.25	21.33	3.4
T99-04	8757.4	28615.2	NA	13	NA	NA	13	NA	0.0
T99-05	8838.3	28506.8	1.93	11.5	11	12.9	10.7	11.51	1.1
T99-06	9173.9	27448.1	1.11	10.5	8.4	9.5	8.7	DRY	0.0
T99-07	9039.0	27444.3	2.44	10.5	10.2	12.6	10.25	DRY	0.0
T99-08	9224.6	27436.6	NA	6.5	NA	NA	5.25	NA	0.8
T99-09	8663.5	28492.3	NA	9	NA	NA	9	NA	0.0
T99-10	9660.0	27441.6	2.81	7.5	7.3	10.1	7.2	DRY	0.0

Northings and Eastings per Monticello Projects Coordinate System
bgs = below ground surface
NA = not applicable
btoc = below top of casing

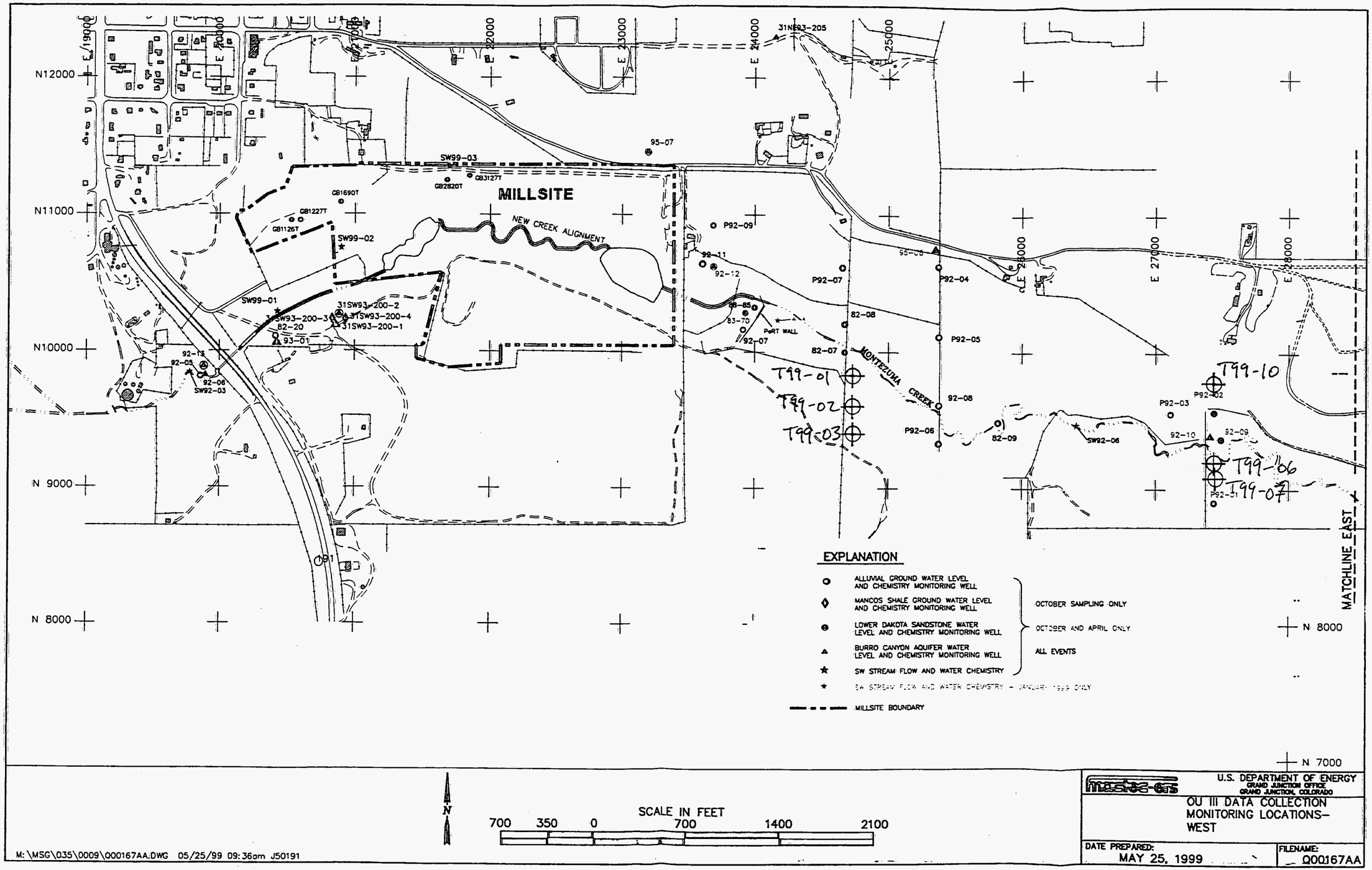


Figure 3.1–1. Ground-Water and Surface-Water Monitoring Network—West

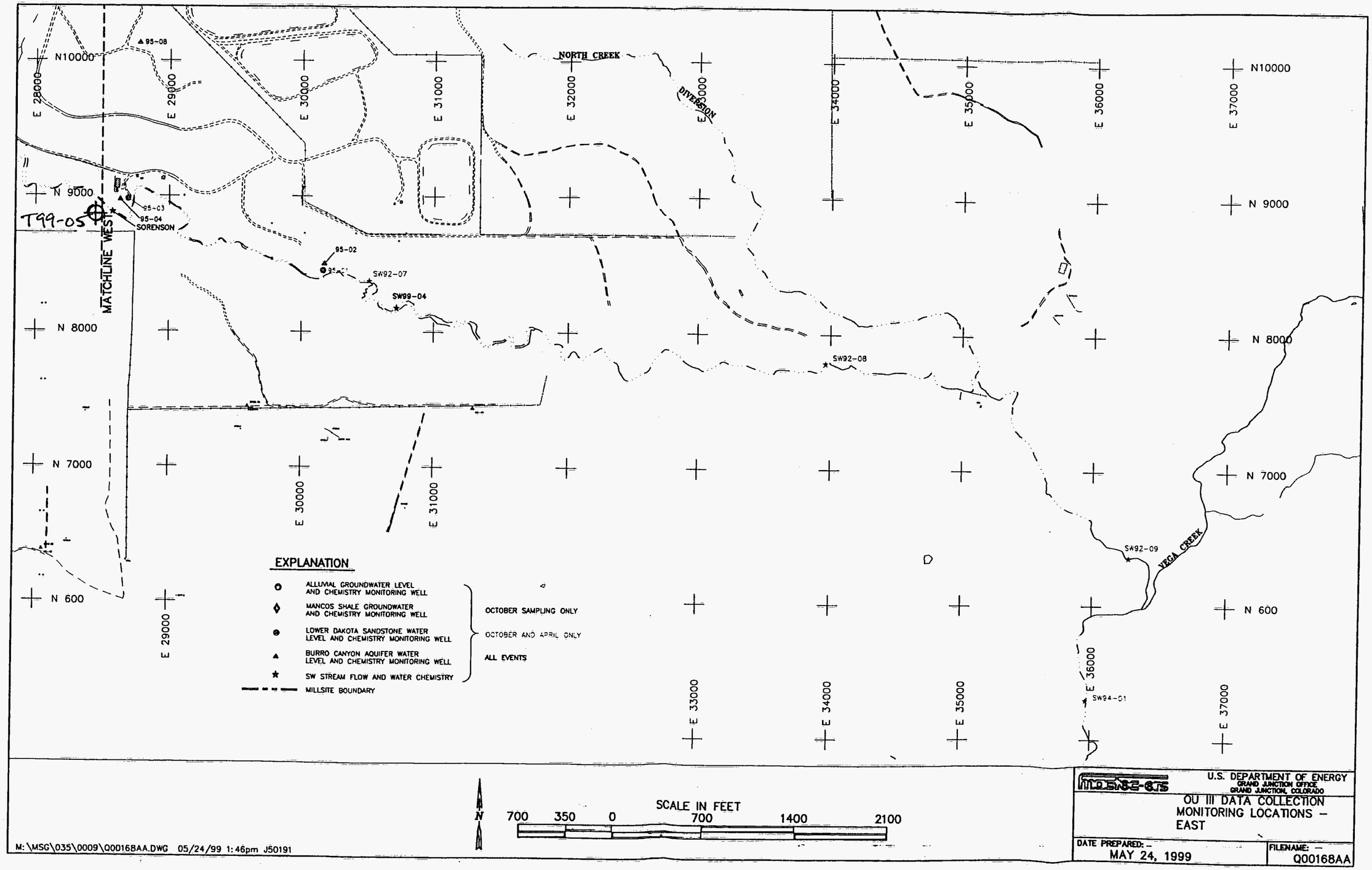


Figure 3.1–2. Ground-Water and Surface-Water Monitoring Network—East

20 OU III
4 (15) AR 576

Program Directive

Program/Project: MMTS - OU III **Directive No.** MSG-99-02

Task Order No. MAC99-03 (Task No 301508001)

Initiated By: Tim Bartlett, Field Supervisor, MACTEC-ERS

Directive Subject: Changes to calibration frequencies at PeRT Wall well locations, clarification of turbidity monitoring for stabilization criteria, and extension of Program Directive MSG-99-01.

Justification and Associated New Task Changes:

(1) Calibration and operational checks of instruments used to monitor field parameters will not be required prior to sampling at each PeRT performance and tracer monitoring well. Additionally, field parameter monitoring and stabilization criteria are not required during well purging. These changes are incorporated into the sampling procedures because of the need to collect samples from the PeRT wells as contemporaneously as possible and considering instrument reliability through historical sampling, the close physical proximity of the shallow PeRT performance and tracer monitoring wells, and preliminary monitoring results indicating parameter stability.
(2) Stabilization criteria for turbidity ≤ 5 NTUs is only required of the last reading when one borehole volume has been evacuated and other criteria (pH, Ec, and temperature) have stabilized over 3 successive readings.
(3) OU III Program Directive MSG-99-01, regarding water level measurements and sampling of temporary wells and designated monitoring wells is extended indefinitely.

Organization(s) Affected: Field sampling personnel.

Affected Documents:

MMTS, OU III, Interim Remedial Action Surface Water and Ground Water Monitoring Plan, Rev. 2, July 1999 (MAC-MSGRAP 1.3.5-1)

MMTS,OU III Interim Remedial Action Work Plan. (Draft) May 1999, (MAC-MSG 2.2.4)

Directive: (1) Calibrate the pH probe and perform operational checks of the Ec probe, oxidation-reduction potential (Eh) probe, turbidity meter, and dissolved oxygen (DO) meter/probe at the beginning of the day, prior to collection of the first sample; mid day; and at the end of the day, following the final sample collected on that day. Record field parameters before samples are collected. *Note:* Per the plan, a 3-point operational check of the Ec probe is required at the beginning and end of each day when samples are collected. (Reference Monitoring Plan pages 4-1 and 4-3 and table 4.2.2.1 page 4-4)

(2) The criteria for defining field parameter stability is as follows: stability is indicated when pH is within $\pm$ 0.3 pH units, and conductivity and temperature are within $\pm$ 10 percent of the most current 3 consecutive readings and when the correct purge volume has been evacuated and turbidity is ≤ 5 NTUs. Turbidity of ≤ 5 NTUs is not required over three successive readings. (Reference Monitoring Plan pages 4-1 and 4-3)

(3) Program Directive MSG-99-01 is extended until further notice. The following text is from the directive and has been modified as indicated:

Add temporary well locations T99-01, T99-03, and T99-05 and existing well locations 92-09, 95-03, P92-01, and P92-02 to the ~~July~~ quarterly sampling event(s).

Measure the water levels in temporary wells T99-01, T99-02, T99-03, T99-05, T99-06, T99-07, and T99-10. Water levels for the existing wells will be measured as specified in the *OU III, Interim Remedial Action Surface Water and Ground Water Monitoring Plan*. Temporary wells T99-01, T99-03, and T99-05 were the only locations where water was present at the time of drilling and installation in June 1999. If water is present in wells T99-02, T99-06, T99-07, and T99-10 samples will be collected. Sampling and analysis requirements for the temporary wells and additional existing wells are specified in Section 3.1.5 of the *OU III Interim Remedial Action Work Plan*.

Collect unfiltered samples for metals and radionuclide analysis at location SW92-06 in place of the W-4 location identified in Section 4.3.2 of the *OU III, Interim Remedial Action Surface Water and Ground Water Monitoring Plan*. If SW92-06 is not accessible the samples should be collected from the Sorenson Site location.

Review and Concurrence:

Kristen McClellen, OU III Project Manager

Task Order Manager Approval to Issue:

9/9/99

Mike Butherus, Manager, Major Projects

Effective Date: September 13, 1999 **Expiration Date:** September 30, 2000

Distribution:

Task Order Managers Directive Log
Jalane Glasgow - Record File MSG 1.14
Holders of all affected documents
Cathy Kelleher (2 copies) - Project Administrative Record